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BLUE JAY

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Associate Editors: Margaret Belcher, J. Bernard Gollop, George F Ledingham.

Editorial Assistants: Georgina Jackson, Shirley Jowsey, Barbara Shourounis

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Cover: *Greenish Blue butterfly. C. R. Wershler*

BLUE JAY

Vol. 37, No. 2 June 1979 Pages 65-128

A NEW WAY TO LOOK AT THE PRAIRIES, *Alex Zellermeyer* 67

MPACT OF OIL SANDS PLANT. *J. David Henry* 70

nsects

SKIPPERS AND BUTTERFLIES OF KANANASKIS PARK, ALBERTA. *Norbert G. Kondla* and *Charles D. Bird* 73

A FLEA BEETLE THAT FEEDS ON THE COMMON PLANTAIN. *Larry Burgess* 86

COLIAS CHRISTINA HABITAT DESTROYED AT THE PAS, MANITOBA. *Walter V. Krivda* 89

Birds

THE PIPING PLOVER IN SASKATCHEWAN: A STATUS REPORT. *Wayne E. Renaud, Guy J. Wapple* and *Durand W. Edgett* 90

THE CATTLE EGRET ARRIVES IN SASKATCHEWAN. *Dale G. Hjertaas* 104

SOCIAL VALUES OF DESERTED ISLAND BIRDS. *W. J. Douglas Stephen* 108

PROTHONOTARY WARBLER AT REGINA, SASKATCHEWAN. *Robert Kreba* 110

CASPIAN TERN NESTS AT LAST MOUNTAIN LAKE, SASKATCHEWAN. *J. R. Caldwell* and *C. Jorgenson* 111

ADULT ALBINO YELLOW-HEADED BLACKBIRD IN MANITOBA. *D. F. Brunton* and *H. L. Dickson* 112

THE HINTON ALBERTA, BLUEBIRD TRAIL, 1976-1978. *Ted W. Carter* 112

PRINCE ALBERT, SASKATCHEWAN BIRD HOUSE TRAIL. *Kevin Aschim* and *Kim Hruska* 114

EASTERN WOOD PEWEES' LONG NESTING PERIOD. *Jean Bancroft* 115

PIPING PLOVERS USE MAN-MADE HABITAT. *Frank A. Switzer* 116

Mammals

MOVEMENT OF BANDED BATS IN ALBERTA. *Hugh C. Smith* 1

NOTES ON SOME MAMMALS OF THE COOKING LAKE HIGHLANDS, ALBERTA. *E. Otto Hohn* 11

Nature Library

RAVENS, CROWS, MAGPIES, AND JAYS. Reviewed by *Bob Kreba* 12

WILD COFFEE AND TEA SUBSTITUTES OF CANADA. Reviewed by *Frank Switzer* 12

THE COMPLETE OUTFITTING AND SOURCE BOOK FOR BIRD WATCHING. Reviewed by *Lois Clark* 12

BOOK LIST AVAILABLE 12

Letters

PRAIRIE NEST RECORDS REPORT. *H. W. R. Copland* 128

SCISSOR-TAILED FLYCATCHER AT TUGASKE, SASKATCHEWAN. *Hugh Hedger* 128

MUSHROOM CORRESPONDENCE REQUESTED. *Robert Kreba* 128

A NEW WAY TO LOOK AT THE PRAIRIES

ALEX ZELLERMEYER, Prairie Wildlife Interpretation Centre, P.O. Box 10, Webb, Saskatchewan, S0N 2X0.

Each year at the height of the summer, over 20,000 people a day pass through the Swift Current area on the Trans Canada Highway. For almost 30% of these people, the prairie section of the cross country route is their only lifetime experience with the grasslands. Not suprisingly, most people find it a bore — an extended 70 mph sprint through a desolate windswept barrens — a lifeless monotony of wheatfields and pastures between Winnipeg and Banff. Or so it seems. These misconceptions are well known. This article deals with a project to do something about them.

In the mid-1960's the Canadian Wildlife Service recognized the detriment to Canada's wildlife habitats caused by a general lack of environmental awareness. Through an Interpretation Section, the Service initiated a series of programs called 'Trans Canada Houses' in each of the country's major natural regions which would allow the travelling public to experience and learn about the different parts of the Canadian natural history mosaic.

In 1969 the first program was opened at Midland, Ontario: the Wye Marsh Wildlife Centre which deals with the hardwood country of eastern Canada. Since that time, three other Centres have come into operation. The Perce Wildlife Centre at Perce, Quebec, tells the story of the Atlantic coast, and the Creston Valley Wildlife Centre deals with the mountain habitats of British Columbia. The fourth and newest program in the series is perhaps the most challenging — the Prairie Wildlife Interpretation Centre — a program to bring the prairies alive for a public that has generally stereotyped this landscape as 'flat and barren'.

What is the Wildlife Interpretation Centre? It is an opportunity for the public to experience the elements of the prairies first-hand, not from a speeding automobile or the sweltering cement of a gas station stop, but along a prairie trail: coulees, cattail sloughs, yellow-headed blackbird colonies, alkali lakeshores, ground squirrels, shorebirds, waterfowl, wheatfields. These are some of the elements of today's prairie. The key word is *today.* Canadian Wildlife Service programs do not have a preservation basis. That mandate belongs federally to Parks Canada. The Prairie program tells the story of the plains as they are today, the factors that have influenced, shaped, and altered the wildlife and wildlife habitats of the region.

This contemporary approach to prairie interpretation has direct effects on the Centre's management and program presentation. For instance, the 1,100 acres of Wildlife Centre property is basically a 'manhandled' piece of land. Cultivation and grazing have been traditional activities and will continue to be so on selected portions of the property. Activities such as these have been major agents of change

Richardson's Ground Squirrel *G. W. Beyersbergen*

on the prairie landscape, and it is these changes that are presented to the public. It is also this environment that the public sees on their passage through the prairies, and which the Canadian Wildlife Service feels must be better understood to prevent mismanagement in the future so that wildlife may survive in spite of our intensive land use practices. Here is a reality that Canadians are learning to understand. It is not enough to simply preserve certain pristine sections of our environments as examples of what once was. That is important, but not enough by itself. Such preservation can foster the mistaken belief that all is well if we set aside examples of untouched habitats. We must also learn to manage the rest of our landscapes with an eye to intelligent land stewardship where the rest of our biological world has consideration. The Prairie Wildlife Interpretation Centre, and the Canadian Wildlife Service Interpretation program are tools to bring about that farsighted goal. The short-term benefit is simply that the travelling public will get a look at the prairies they never expected. They will get a chance to stretch their legs and learn things that will make this continued prairie drive more alive, and more meaningful.

The Centre also offers an opportunity for the accomplished naturalist to see a cross-section of the short grass plains natural and cultural history on a compact and accessible piece of land. Although inventories are far from complete, the Centre has a hypothetical list of 43 mammals (15 have been observed on the land).

Pronghorns *Prairie Wildlife Centre*

Over 150 species of birds have been recorded with a potential of some 270 species, while an updated plant list now standing at 436 is expected to exceed 475 species. As you can imagine, we have quite a variety of habitats! Nor is the cultural aspects of the plains unrepresented. The land boasts sections of the original CPR rail grades, abandoned since the early 1900's. The Bone Pickers Trail may still be seen as a depression in the landscape, and several teepee rings mark the site of pre-European plainsmen passing through the area. These natural and cultural history representations of the prairie story, on an accessible piece of land near a population centre, are the reasons for the establishment of the Centre 18 miles west of Swift Current.

How does the Prairie Wildlife Interpretation Centre work? There are two basic elements to the program. First, there is the Centre property itself. Using a series of self-guided trails and outdoor exhibits, visitors can reach their own level of involvement depending on their interest or the time they have available. The Centre's building is an orientation, information, and services area. It houses a display floor, a natural history resource area (with field guides, tapes, and other references), and a theatre. To help people enjoy the area, a 'nat pack' will be available with binoculars and field guides. The second element of the scheme is called the 'Mobile Program'. It consists of a display trailer which travels the Trans Canada Highway stopping wherever the travelling public pulls off the road; picnic sites, campgrounds, points of interest, and information booths. The trailer's displays explain the features seen by prairie travellers, while brochures and pamphlets are offered for further reference to make the prairie drive more interesting. Trained interpreters answer questions from 'marsh hawks to mileage'.

Scheduled to be completely operable by 9 June, 1979, the Prairie Wildlife Interpretation Centre fills a major gap in grassland interpretation.

Sunset at Jeanette Lake, Meadow Lake Provincial Park *Menno Fiegut*

IMPACT OF OIL SANDS PLANT

J. DAVID HENRY, Saskatchewan Chapter of the National and Provincial Parks Association of Canada, P.O. Box 1624, Prince Albert, Saskatchewan, S6V 5T2.

What impact will the development of the oil sands along the Alberta border have on Saskatchewan? This is a question that needs serious and immediate consideration now that Imperial Oil Ltd. has made an application to build a 4.7 billion dollar plant near Cold Lake, approximately 25 miles west of Meadow Lake Provincial Park. The Company proposes to recover deeply buried bitumen (tar) by injecting pressurized steam into deep wells. The bitumen would then be upgraded to a synthetic crude oil. The production capacity of the operation is estimated to be 141,000 barrels of synthetic crude oil per day.

Imperial Oil has also made application to mine 2.5 million tons of coal per year at Judy Creek, Alberta, to generate steam and electricity for the bitumen extraction and upgrading operations.

Imperial Oil provided a preliminary environmental and socio-economic impact assessment to the Alberta Engergy Resources Conservation Board (AERCB) in May 1978, and public hearings on the proposal were held at Grand Centre, Alberta, from 4 December 1978 until 18 January 1979. The Saskatchewan Chapter of he National and Provincial Parks Association was one of several citizen groups that presented briefs at these public hearings. The chapter expressed concern about the project because of its possible adverse effects on Saskatchewan lands.

Possible Impact on Saskatchewan

The project, if approved, will remove 580,000 barrels of fresh water per day from Cold Lake. The impact of this water removal on the waterfowl and fisheries habitat along Cold River and Waterhen River in Meadow Lake Provincial Park may be considerable.

After being polluted (both chemically and thermally) this water will have to be disposed of. Imperial Oil is apparently planning both deep well disposal (which could affect groundwater quality) and discharge of effluents into the Beaver River, a tributary of the Churchill River.

The bitumen to be recovered is high in sulphur content. As a result, hydrogen sulphide and sulphur dioxide, produced during the upgrading process, may become serious air pollutants in the neighbouring areas of Saskatchewan.

Analysis and Mitigative Measures

Basically Imperial Oil proposes to use 2.5 million short tons of coal and 350 megawatts of electricity on an annual basis in order to produce 141,000 barrels per day of synthetic crude oil. The Chapter views this proposal as an inefficient chain of interfuel conversions. Furthermore, we view this project as a capital and resource intense proposal that is not based on conversion of our energy requirements to renewable resources; nor does the Imperial Oil application consider the end-use efficiencies or energy quality of the resources consumed in its production process.

We expressed concern that the Cold Lake project was being considered in isolation, rather than identifying environmental standards appropriate for the region as a whole. A procedure should have been initiated to establish development guidelines for the total area encompassed by the Cold Lake/Lloydminster heavy oil deposit. There are at least five other oil companies interested in similar types of development; if approved, each of these developments will have similar impact upon the region. Furthermore, strict water regulatory and air emission standards are needed since some of these projects will be adjacent to prime recreational lands such as Meadow Lake Provincial Park. This park has rich terrestrial and aquatic wildlife resources which deserve the strictest of environmental control regulations.

The Chapter is critical of the plan to use coal from Judy Creek, Alberta, as a balancing fuel in the Cold Lake project. The Judy Creek coal mines would be adjacent to an area of the Swan Hills that has been recommended for a wilderness recreation area and contains an important IBP ecological site. We note that the Imperial Oil application states that desulphurized bitumen from the upgrading process could be used as an alternate balancing fuel with the result that the production process would operate at 89% efficiency (125,000 barrels of synthetic crude oil per day instead of 141,000 barrels). The Chapter recommended that this alternate balancing fuel be thoroughly investigated regarding cost-benefit and environmental impact and incorporated into the project if at all possible.

With regard to air quality, the main

Cold River entering Pierce Lake, Meadow Lake Provincial Park *P. Albertso*

concern lies largely with the cumulative pollution from existing and future projects in the region. The Chapter is particularly concerned about the possible effects of air-borne sulphur emissions on adjacent lakes in Saskatchewan since these lakes have been shown to be among the most productive commercial and sport fishing lakes within the province. The Chapter recommended that Environment Canada take a leading role in estimating the possible impact of sulphur emissions from the several heavy oil plants that may be located in this area. The object of this research should be to determine the need for emission standards on an interprovincial regional basis.

Another concern is that seepage from project-related tailing ponds and lagoons may enter the groundwater regime. Although Imperial Oil has outlined the measures that would be taken to prevent or minimize seepage, it has not described a monitoring system for early detection of seepage should it occur, nor has it indicated how containment would be effected.

The AERCB public hearings on the Cold Lake project were poorly advertised in Saskatchewan. Furthermore Saskatchewan's interests are not represented on the AERCB. Yet the water and air effluents of the Cold Lake project may have considerable impact on Saskatchewan lands. Since this is the case, the Chapter recommended that public hearings on the project be held in Saskatchewan so that our province's interests and concerns can more adequately be reviewed. The Chapter also recommended that a representative from the Saskatchewan Department of the Environment be allowed to serve as an adjunct member of the AERCB during the final decision making process concerning this project.

The Chapter encourages individual citizens who are concerned about the possible impact of the Cold Lake project on Saskatchewan to express their concern to provincial government officials. It is particularly important that proper environmental approaches and standards be adopted for this project since it is likely to be the first of a series of developments proposed for the heavy oil belt that straddles the provincial boundary.

SKIPPERS AND BUTTERFLIES OF KANANASKIS PARK, ALBERTA

NORBERT G. KONDLA, Parks Division, Alberta Recreation, Parks & Wildlife, Edmonton, Alberta, and CHARLES D. BIRD, Department of Biology, University of Calgary, Calgary, Alberta.

Situated in the front ranges of the Rocky Mountains, approximately 70 kilometres southwest of Calgary, Kananaskis Provincial Park is the most recent addition to the parks system and was established by an Order-in-Council in the fall of 1977. Much of the current park area of 50,308 ha has been investigated from a natural resource viewpoint as part of the planning and development process. Figure 1 shows the area for which extensive resource information (including butterflies and skippers) is available. This paper essentially deals with the white area rather than the total existing park.

The park is a high elevation environment for butterflies; the lowest oint being 1,604 m along the Kananaskis River near the conuence with King Creek while the ighest point is 3,344 m on Mt. Sir Douglas. The mountain ranges run in northwest-southeast direction and enerally have summit elevations between 2,432 m and 3,040 m while the intervening valleys have floor elevations between 1,672 m and ,976 m.

Much of the park has slopes in excess of 30% and most of the typical Cordilleran landforms including cirques, hanging valleys, talus slopes, sheer rock faces, and alluvial fans as well as a variety of ice contact and glacio-fluvial deposits that date from the Wisconsin glaciation. The bedrock of the western portion is predominantly limestone and dolomite while sandstone and shale is more prevalent in the eastern portion.

Limited climatic data indicates that the park is situated in a relatively cool and moist portion of the front ranges. In consequence the vegetation consists largely of cool, moist spruce-fir forest of the subalpine zone. These forests are opened at irregular intervals by snow avalanches, creating linear patches of young trees, shrubland or meadows; depending on slope, aspect, elevation, and avalanche frequency. Much of this zone is covered by fire-successional lodgepole pine forests. Landslides and bedrock outcrops also provide breaks in the subalpine forest.

Depending on slope exposure, the climatic forestline occurs roughly from 2,098 m to 2,219 m. Above this altitude, forest gives way to isolated clumps of trees, then isolated and depauperate trees, and finally the alpine zone with treeless vegetation consisting of meadows, heaths, and rocklands. Major variation in plant communities is dramatic over short distances due to wind, snow, and microtopography. Increasing altitude leads to open vegetation dominated by rock-dwelling lichens and cushion-forming plants until bare rock, permanent snowbanks, and glaciers comprise the environment.

An interesting aspect of Kananaskis Park is the abundance of wetlands resulting from beaver ac-

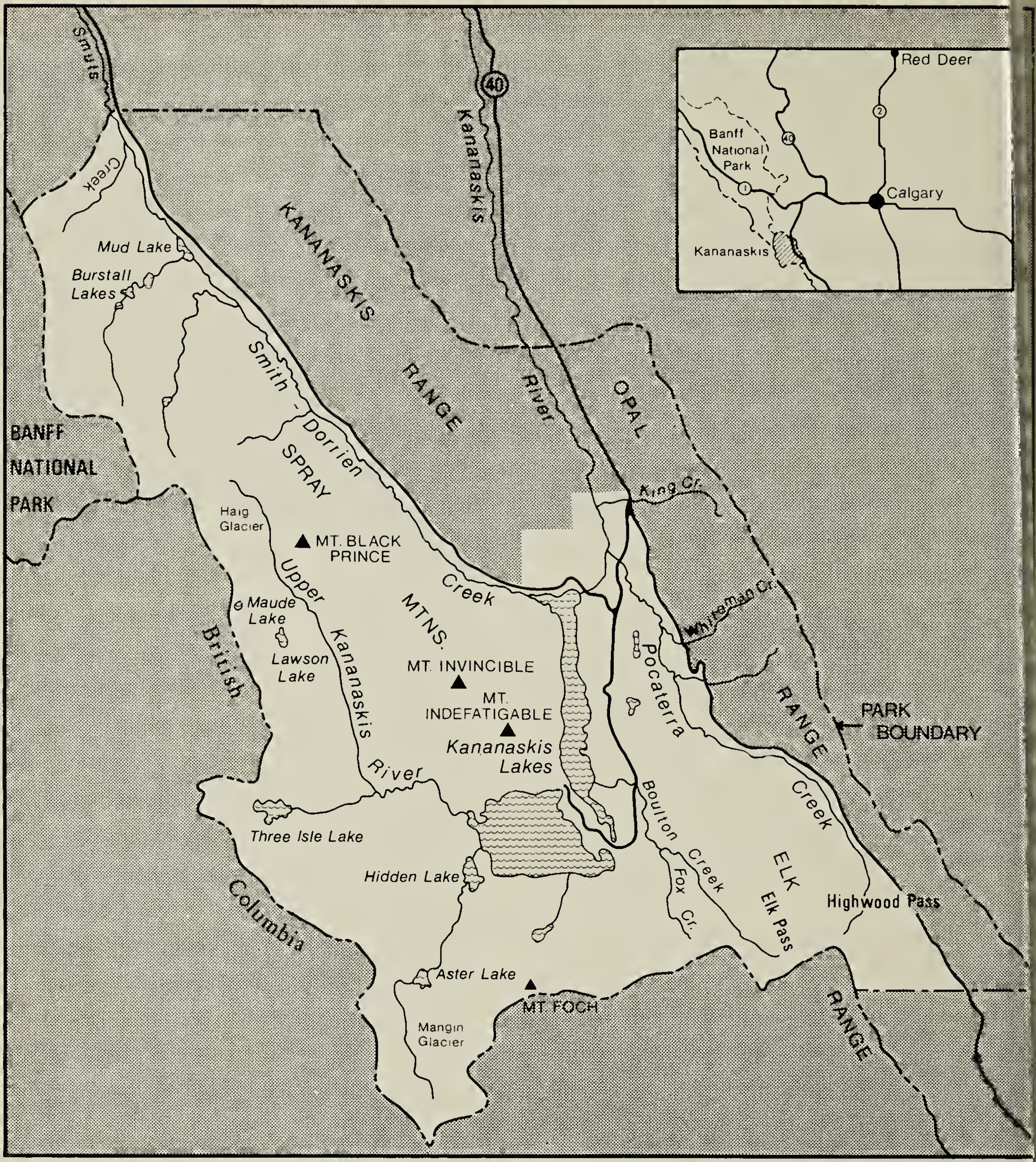

Figure 1 Kananaskis Provincial Park place names used in this paper. Roughly one third of the study area consists of glaciers, permanent snow banks, rock barrens and water; habitat unsuited for butterflies.

tivity and groundwater discharge in the more gently sloping portions of the valleys. These generally linear wetlands support spruce and pine bogs, tall shrub fens, low shrub fens with willows and bog birch, and sedge fens.

Montane habitats are represented in the park by two stands of Dougla fir forest — along the King Cree gorge and on the lower south slop of Mt. Indefatigable. Meadows an dry grasslands at the lowe elevations are restricted to smal areas, usually on steep south an west facing slopes.

Major sources of information on e natural resources of the park are ovided by Bird[5], Jaques[10] ondla[12], Milus Tress Barron[14], eregrine Research and Documen- tion[16], and Trottier[21]. Figures 2 to 5 ustrate major butterfly habitats.

formation Base

The first collections were made by . B. Sanson in 1922. No other ollections are known until 1955 hen R. Coyles and J. R. McGillis ollected at Highwood Pass. Sub- equently the Highwood Pass has een collected by R. L. Anderson in 958, 1959, 1960, and 1961; J. Legge 1961, 1962, and 1971; S. higematsu in 1968, 1971, and 1972; . D. Bird in 1975; H. Pinel in 1975 nd 1976; A. Wisely in 1976; and N. ondla and M. R. Lein in 1977. Other eas of the park have had minor ollections by R. L. Anderson, A. I. W. acKenzie, S. Shigematsu, A. D. ird, and C. D. Bird. Major collec- ons from other areas of the park ave been made by A. Wiseley in 976 during a wildlife inventory for e Parks Division and by N. Kondla uring a reconnaissance vegetation urvey in 1977, also for the Parks ivision. Previous reports on butter- es of this area are an annotated list Bird[5] and an annotated list of iseley's collections and obser- ations[16].

Thus, this paper is based on ollections by 13 people, in 13 dif- erent years. All records except the ourning Cloak are supported by oucher specimens examined by ther of the present writers. Records e available from the beginning of e flight season in late May to the nd of September.

nnotated List

ESPERIIDAE — Skippers

PECK'S SKIPPER *(Polites coras):* Known from one collection by Shigematsu at Highwood Pass on 7 July 1968.

DRACO SKIPPER *(Polites draco):* This insect was found to be abundant in a meadow east of the Lower Kananaskis Lake by Kondla on 25 June and 21 July 1977.

MANITOBA SKIPPER *(Hesperia comma manitoba):* Apparently uncommon and local; known from a few collections by Anderson and Shigematsu at Highwood Pass and by Wiseley near the east side of Lower Kananaskis Lake. This species appears to prefer open, grass-rich habitats and is therefore most likely to be seen at higher elevations in the alpine and upper subalpine zone. Flight records 7 July to 9 August.

ARCTIC SKIPPER *(Carterocephalos palaemon mandan):* Known from a 7 August 1972 collection by Shigematsu and a 24 July collection by Lein at Highwood Pass and a collection by Kondla on 9 June at King Creek fan. Occasional sight records in clearings at lower elevations during 1977.

PERSIUS DUSKY WING *(Erynnis persius):* Specimens collected at Highwood Pass (Shigematsu), King Creek fan (Wiseley and Kondla), and the lower Boulton Creek area (Kondla). Seen regularly on dry open hillsides at lower elevations. Flight records 9 June to 11 July.

PAPILIONIDAE — Swallowtails

CLOUDED PARNASSIAN *(Parnassius phoebus smintheus):* Strangely unreported prior to 1976 despite the many collections in suitable habitat of the Highwood Pass. Reported by Wiseley from a number of locations in 1976 but Kondla found it at only one alpine location just west of Mt. Indefatigable in 1977 despite visits to apparently suitable habitat under ideal weather conditions. Flight records 16 July to 26 September.

GOTHIC SWALLOWTAIL *(Papilio zelicaon gothica):* Known from one collection by Wiseley on 15 July 1976 NE of the Lower Kananaskis Lake.

PIERIDAE — Whites, Sulphurs and Marbles

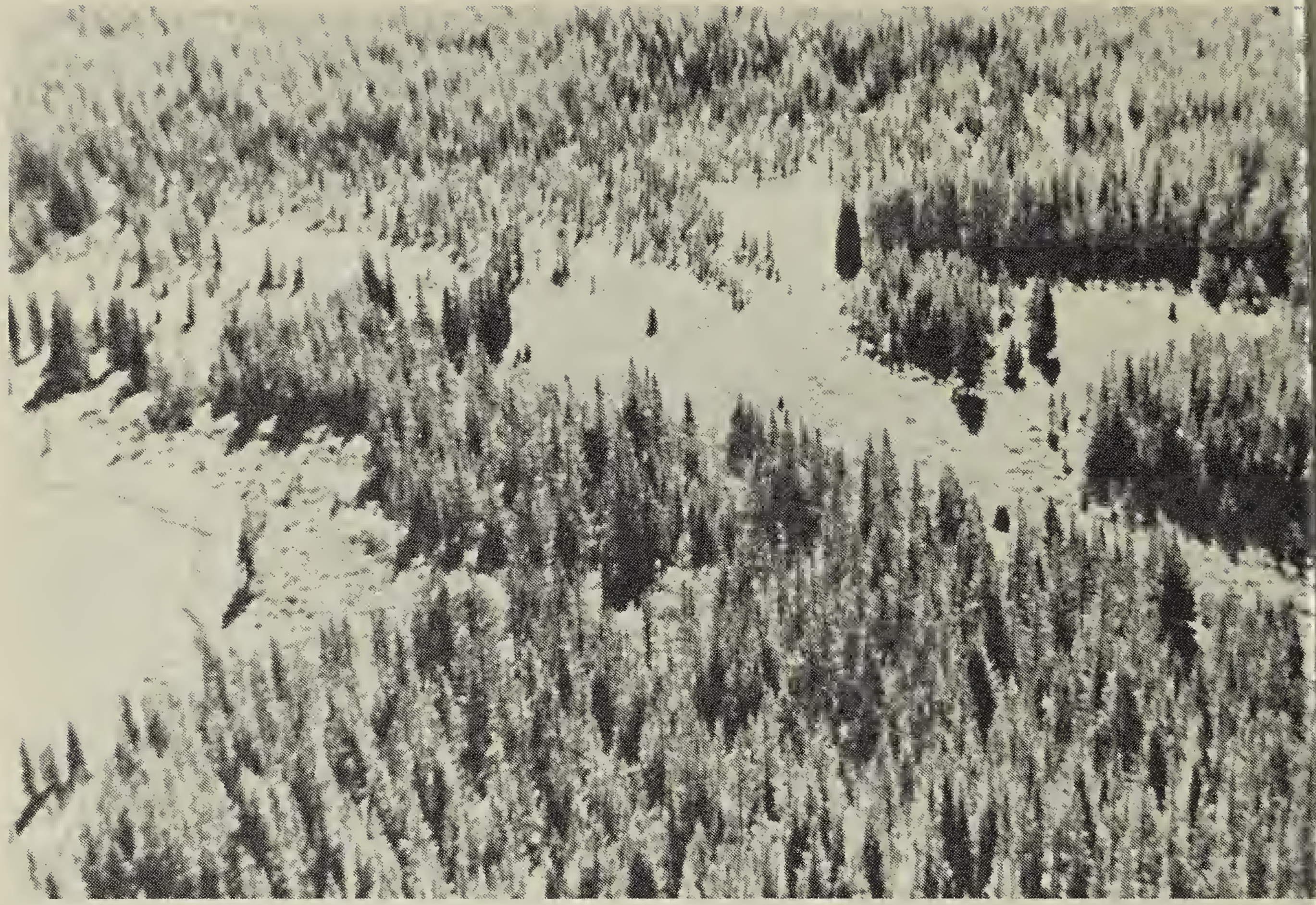

Figure 2: Aerial view of conifer bog habitat for Jutta Arctic, birch-willow fen habitat
Frigga Fritillary, and lodgepole pine habitat for Purple Lesser Fritillary in the Kananas
valley.

CALIFORNIA WHITE *(Pieris sisymbrii flavitincta):* Two fresh females were collected by Kondla on 9 June 1977 at King Creek fan and King Creek gorge. Since previous investigators have not been in the field so early, the species may be more abundant here than these records indicate.

WESTERN CHECKERED WHITE *(Pieris protodice occidentalis):* Reported by Coyles, McGillis, Bird and Lein at Highwood Pass. Also reported by Wiseley near the Lower Kananaskis Lake and Kondla at the Upper Kananaskis Lake. Flight records 24 July to 6 September.

MUSTARD WHITE *(Pieris napi):* Found near Fox Creek by Wiseley and at several locations east of Lower Kananaskis Lake by Kondla. Flight records 9 June to 21 July.

CABBAGE BUTTERFLY *(Pieris rapae):* This introduced species was found by Kondla in a willow/sedge fen at East Elk Pass on 7 August 1977 and along the weedy edge of Upper Kananaskis Lake on 23 August 1977.

ORANGE ALFALFA BUTTERFLY *(Coli*
eurytheme eurytheme): Known only fro
one fresh male caught by Kondla 25 Ju
1977 on King Creek fan. Apparently
stray migrant since the species is n
known to overwinter in Alberta.

ELIS SULPHUR *(Colias meadii elis*
Collected at Highwood Pass by Coyle
Anderson, Legge, Shigematsu, Bir
Wiseley, Lein and Kondla. Also found
Mt. Invincible and SE of Lowe
Kananaskis Lake by Wiseley as well as c
Mt. Indefatigable by Kondla. Apparently
fairly common species of alpine an
subalpine meadows. Flight records 8 Ju
to 6 September.

YELLOW ALFALFA BUTTERFLY *(Colia*
philodice eriphyle): A few scattere
collections by McGillis, MacKenzie an
Wiseley. Flight records 7 July to 2
August.

PINK-EDGED SULPHUR *(Colias interic*
interior): Lein collected 2 fresh males o
24 July 1977 at Highwood Pass.

ALEXANDRA SULPHUR *(Colias alexan*
dra christina): No known records prior t

igure 3: South half of King Creek fan. Great diversity of habitats at a relatively low levation makes this one of the most productive areas for butterflies. Some species to e found here are Colorado Orange-tip, Gillett's Checkerspot, and Freija Fritillary.

976. Collected by Wiseley and by Kondla t a few lower locations east of the lakes. light records 25 June to 26 September.

ELIDNE SULPHUR *(Colias pelidne inisni* Bean): Numerous records from ighwood Pass by Coyles, Anderson, higematsu, Legge, and Bird. Also found n Mt. Indefatigable by Kondla. An alpine nd upper subalpine zone species. Flight ecords 20 July to 6 September.

ASTES SULPHUR *(Colias nastes treckeri):* Many records from Highwood ass by Coyles, Anderson, Shigematsu, inel, Wiseley and Lein. A ubiquitous pecies of alpine meadows. Found on Mt. ndefatigable by Kondla. Flight records 22 uly to 29 August.

OLORADO ORANGE-TIP *(Anthocaris ara julia):* Not reported until 1976 when iseley found it at King Creek fan, Fox reek, and lower Boulton Creek. A outhern species of montane habitats ear the northern limit of its range here. lso found in 1977 by Kondla at King reek fan. Flight records 9 June to 17 uly.

CREUSA MARBLE *(Euchloe creusa):* Reported from Highwood Pass by Anderson, Pinel, Wiseley and Lein. Also located by Wiseley at Fox Creek and by Kondla at King Creek fan and Boulton Creek fan. Flight records 14 June to 24 July.

LYCAENIDAE — Gossamer-winged Butterflies

MARIPOSA COPPER *(Lycaena mariposa mariposa):* Not reported until 1976 when Wiseley found it one mile SE of Lower Kananaskis Lake. Also found in wetlands and clearings in 1977 by Kondla. Flight records 17 July to 22 August.

ARETHUSA COPPER *(Lycaena phlaeas arethusa):* So far known only from one collection by Anderson on 9 August 1958 at Highwood Pass.

SNOW'S COPPER *(Lycaena snowi snowi):* First found by Sanson in Upper Kananaskis Pass in 1922[4]. Subsequently reported by Shigematsu and Lein for Highwood Pass and Kondla in an alpine area just west of Mt. Indefatigable. Flight records 24 July to 11 August.

Western Tailed Blue *C. R. Wersh*

SCUDDER'S BLUE *(Lycaeides argyrognomon scudderii):* Reported by Anderson, Kondla, Shigematsu, and Wiseley from Highwood Pass, west of Mt. Indefatigable, lower Smith-Dorrien valley and numerous locations in the Kananaskis valley east of the lakes. Most abundant in open, dry areas at lower elevations. Flight records 22 July to 2 September.

GREENISH BLUE *(Plebejus saepiolus amica):* Known from collections by MacKenzie, Wiseley, and Kondla east of the lakes and by Kondla in an alpine area at Lawson Lake. Flight records 14 June to 18 August.

ACMON BLUE *(Plebejus acmon lutzi):* The only record so far is one fresh male taken by Kondla on 22 July 1977 in an open pine bog near Whiteman Creek.

ARCTIC BLUE *(Plebejus aquilo megalo* Found at Highwood Pass by Anderso Coyles, Kondla and Lein. Also recorde by Kondla and by Wiseley east of th lakes and by Kondla west of Mt. In defatigable and Elk Pass. Fairly commo in the lower alpine and upper subalpin zones although it is present in even th lowest areas of the park. Flight records 2 July to 31 August.

WESTERN TAILED BLUE *(Everes amyr tula albrighti):* Collected by Shigemats and Lein at Highwood Pass and Wisele on the north side of the Upper Kananaski Lake. Flight records 4 July to 24 July.

SILVERY BLUE *(Glaucopsyche lygdamu couperi):* Reported from Highwood Pas by MacKenzie, Pinel, and Shigematsu Taken at a number of localities east of th lakes by Kondla and by Wiseley as well a y Wiseley in the Elk Pass and by Kondla n Mt. Indefatigable. Most often seen in ry clearings at lower elevations. Flight ecords 30 May to 31 July.

YMPHALIDAE — Brush-footed Butterflies

ED ADMIRAL *(Vanessa atalanta rubria):* nly record to date is one worn specimen y Kondla in a large meadow east of the ower Kananaskis Lake on 25 June 1977.

ILBERT'S TORTOISE-SHELL *(Nymhalis milberti furcillata):* Found in almost ll habitats by Coyles, Bird, Anderson, Viseley, Kondla, and Lein at Highwood ass, Mt. Invincible, Mud Lake, Smithorrien valley, King Creek fan, and east of e lakes. Flight records 23 May to 25 Sepember.

IOURNING CLOAK *(Nymphalis antiopa ntiopa):* The only report is a sight record y Kondla on 7 June 1977 on King Creek an.

ATYR ANGLE-WING *(Polygonia satyrus atyrus):* Only two records; Wiseley found his species on the east side of Lower ananaskis Lake on 31 August 1976 and ondla found it in subalpine forest near laude Lake on 10 August 1977.

EPHYR ANGLE-WING *(Polygonia ephyrus):* Found by Bird at Highwood ass on 6 September 1975 and by Kondla rom 23 May to 10 June 1977 at upper mith-Dorrien valley, King Creek gorge, nd Upper Kananaskis Lake.

AMOETAS CHECKERSPOT *(Chlosyne amoetas):* This local and rare species as so far only been found by Shigematsu t Highwood Pass on 21 July 1971.

ROCKY MOUNTAIN CHECKERSPOT *Chlosyne palla calydon):* Only two ecords available. Anderson found it 26 uly 1959 at Highwood Pass and MacKenie found it at the lakes on 6 July 1963.

EARL CRESCENT *(Phyciodes tharos haros):* The only known occurrence omes from a report by Wiseley, 1 July 976 at Fox Creek.

MEADOW CRESCENT *(Phyciodes campestris campestris):* Collected at Highwood Pass by Shigematsu and Lein. Found at numerous places east of the lakes by A. D. Bird, Shigematsu, Wiseley, and Kondla. Also recorded west of Mt. Indefatigable and upper Smuts Creek by Kondla. Flight records 25 June to 19 August.

ANICIA CHECKERSPOT *(Euphydryas anicia anicia):* Reported by MacKenzie, Shigematsu, Pinel, and Kondla at Highwood Pass. Also found at a number of sites east of the lakes by Wiseley and by Kondla. Flight records 25 June to 18 August.

BEAN'S CHECKERSPOT *(Euphydryas editha beani):* This alpine species has only been reported from Highwood Pass by Pinel on 24 July 1976.

GILLETT'S CHECKERSPOT *(Euphydryas gilletti):* Relatively few records of this local species are available. It has been found at Highwood Pass by Legge and at a few locations east of the lakes by Mackenzie, Wiseley, and Kondla. Flight records 25 June to 22 July.

SILVER-BORDERED FRITILLARY *(Boloria selene):* Reported from three locations east of the lakes by Wiseley and by Kondla. Apparently a species of low shrub fens in this area. Flight records 17 July to 21 August. The Alberta populations of this species have been most frequently referred to the subspecies *atrocostalis*[18] but Kohler[11] presents information to indicate that Alberta material represents a wide band of intergradation between the subspecies *tollandensis* and *atrocostalis.*

MEADOW FRITILLARY *(Boloria bellona jenistai):* Reported by MacKenzie on 6 July 1963 east of the lakes.

FRIGGA FRITILLARY *(Boloria frigga saga):* Found by MacKenzie and by Kondla in wetlands east of the lake. Very abundant in low shrub fens dominated by bog birch. Flight records 9 June to 6 July.

FREIJA FRITILLARY *(Boloria freija freija):* This early flying species was found by Kondla in most open habitats at King Creek fan on 9 June 1977.

PURPLE LESSER FRITILLARY *(Boloria titania grandis):* Specimen and sight records too numerous to detail. Present abundantly in almost all forested portions of the park. Flight records 15 July to 29 August.

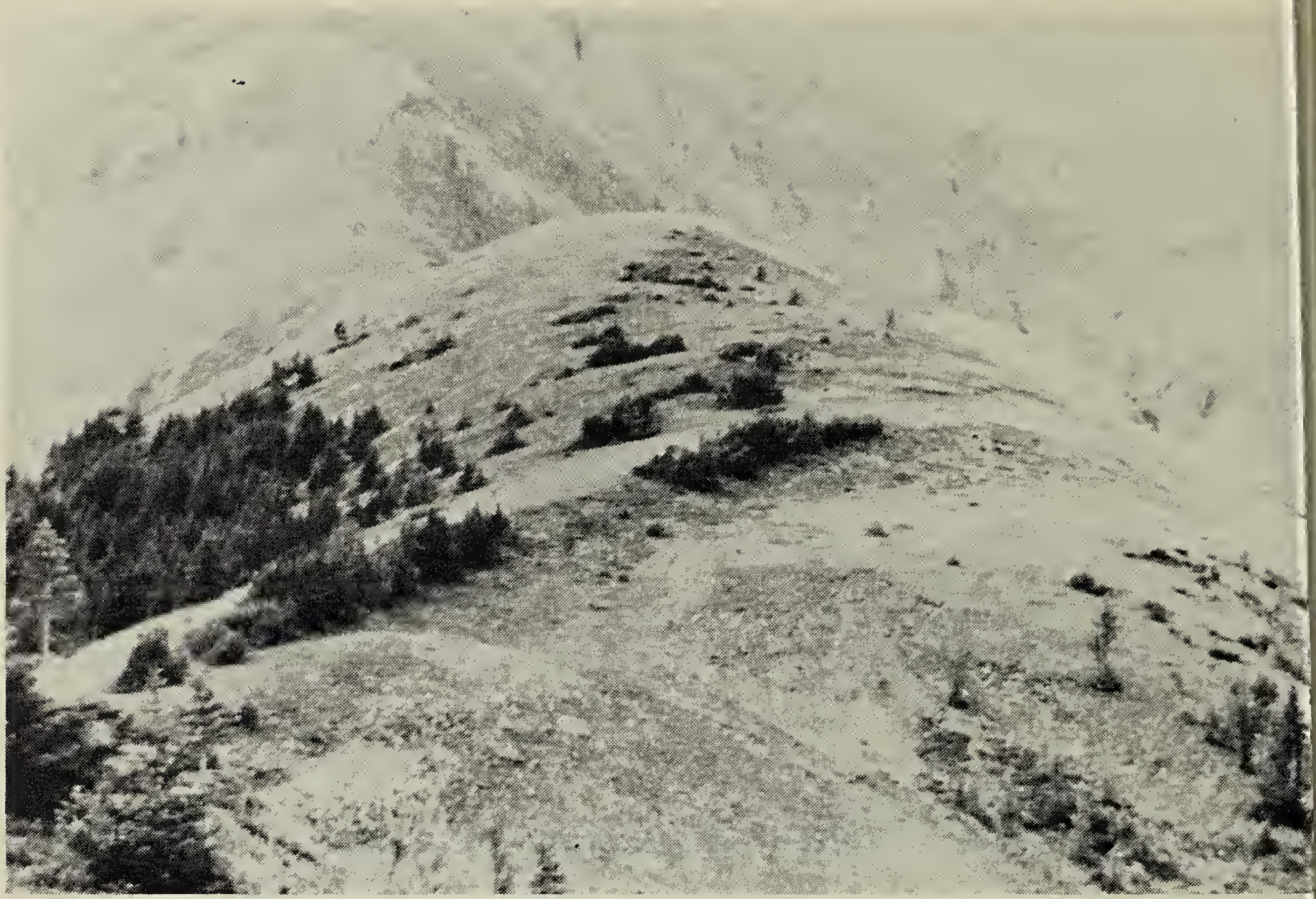

Figure 4: Barren rock cliffs above ridge with alpine and upper subalpine habitats. Ridg is habitat for such species as Clouded Parnassian, Nastes Sulphur, Snow's Copper, ar Arctic Blue.

EDWARD'S FRITILLARY *(Speyeria edwardsii):* Only known from one specimen by MacKenzie on 6 July 1963 east of the lakes.

ZERENE FRITILLARY *(Speyeria zerene garretti):* Shigematsu found one at Highwood Pass on 7 July 1968.

BEANS'S FRITILLARY *(Speyeria atlantis beani):* Found at many lower elevation sites in the Kananaskis valley by McKenzie, Shigematsu, Wiseley, and Kondla. Flight records 25 June to 31 August.

HYDASPE FRITILLARY *(Speyeria hydaspe sakuntala):* This distinctive fritillary was discovered by Kondla on 5 August 1977 north west of the Upper Kananaskis Lake and at King Creek fan on 19 August 1977.

MORMONIA FRITILLARY *(Speyeria mormonia eurynome):* Reported by Sanson, MacKenzie, Pinel, Wiseley, and Kondla from most parts of the park up to timberline. Flight records 15 July to 22 August.

VARIEGATED FRITILLARY *(Euptoieta claudia):* One report by MacKenzie on July 1963 near the lakes.

SATYRIDAE — Meadow Browns

SMALL WOOD NYMPH *(Cercyonis oetu charon):* Reported by Anderson for Hig wood Pass on 9 August 1958 and Kondl on 19 August on King Creek fan.

MACOUN'S ARCTIC *(Oenei macounii)* Reported by MacKenzie on 6 July 196 east of the Lower Kananaskis Lake.

CHRYXUS ARCTIC *(Oeneis chryxu chryxus):* Found at Highwood Pass b Coyles, Wiseley, Kondla and Lein as wel as at a number of sites in the Kananaski valley by MacKenzie, Wiseley, an Kondla. Flight records 14 June to August.

JUTTA ARCTIC *(Oeneis jutta chermocki):* This very dark subspecies was located by Kondla in fens and bogs of the area east of the Lower Kananaskis Lake. Most frequently seen in open pine and spruce bog margins of the linear wetlands. Flight records 9 June to 22 July.

BEAN'S ARCTIC *(Oeneis melissa beani):* Only found by Pinel at Highwood Pass on 24 July 1976.

BRUCE'S ARCTIC *(Oeneis polixenes brucei):* The only report so far is by Wiseley at Highwood Pass on 8 July 1976.

COMMON ALPINE *(Erebia epipsodea epipsodea):* Reported from Highwood Pass by Coyles, Pinel, Wiseley, and Lein. Found at a number of locations in the Kananaskis valley by Wiseley and by Kondla. Flight records 14 June to 9 August.

Discussion

As reported in the annotated list, the known Rhopaloceran fauna of the park consists of 59 species in 6 of the 7 families reported for Alberta. In terms of the number of species per family, the Alberta fauna is representative of the ranking of families for Canada and the U.S.A. The only difference is that in the continental fauna the Lycaenidae contains more species than the Nymphalidae.

As shown in Table 1, the situation in the park is substantially different. In the park fauna, the families Pieridae, Nymphalidae, and Satyridae form a significantly larger portion of the fauna than they do in the provincial fauna. In contrast, the Hesperiidae and Lycaenidae are proportionally less represented in the park fauna.

A preliminary analysis of reported butterfly faunas of mountain areas in western North America[1 2 6 7 15 20] shows a consistently greater percentage of Nymphalidae and a lesser percentage of Hesperiidae and Lycaenidae in the more northerly mountain areas as compared with the more southerly areas.

Table 2 compares the elevation and butterfly phenology of the park with Banff National Park[2], Plateau Mountain[1], and Calgary[3]. The data show a clear and dramatic shortening of the flight period as well as a pronounced seasonal shift in the peak flight period in relation to increasing altitude. The peak number of species decreases noticeably with increasing altitude when the three mountain areas are compared but there is no significant difference between Banff and Calgary. The peak Calgary flight period is substantially earlier than the mountain areas.

These differences may be attributed to the greater climatic, habitat, and faunal differences between Calgary and mountain areas. In contrast, Kananaskis butterfly phenology parameters are consistently intermediate in comparison to Banff and Plateau Mountain; a situation that is expected due to the intermediate environmental and geographic position of Kananaskis.

The absence of certain species is as interesting as is the presence of others. For example, a number of widespread and generally abundant species have not been reported in the park. These include the Tiger Swallowtail *(Papilio glaucus),* Spring Azure *(Celastrina argiolus),* White Admiral *(Limenitis arthemis),* Hoary Elfin *(Callophrys polios),* Brown Elfin *(Callophrys augustinus),* Western Pine Elfin *(Callophrys eryphon),* Ringlet *(Coenonympha tullia),* and Dreamy Dusky Wing *(Erynnis icelus).* Sufficient field research was undertaken by Kondla at suitable times and habitats to indicate that these species must be very local if they are indeed present in the park.

The absence of the Tiger Swallowtail, Spring Azure, White Admiral, and Dreamy Dusky Wing can be explained by the effective absence of poplar forest habitat with its associated larval food plants. Poplars are present only in scattered small stands and isolated trees. Similarly the lack of grasslands,

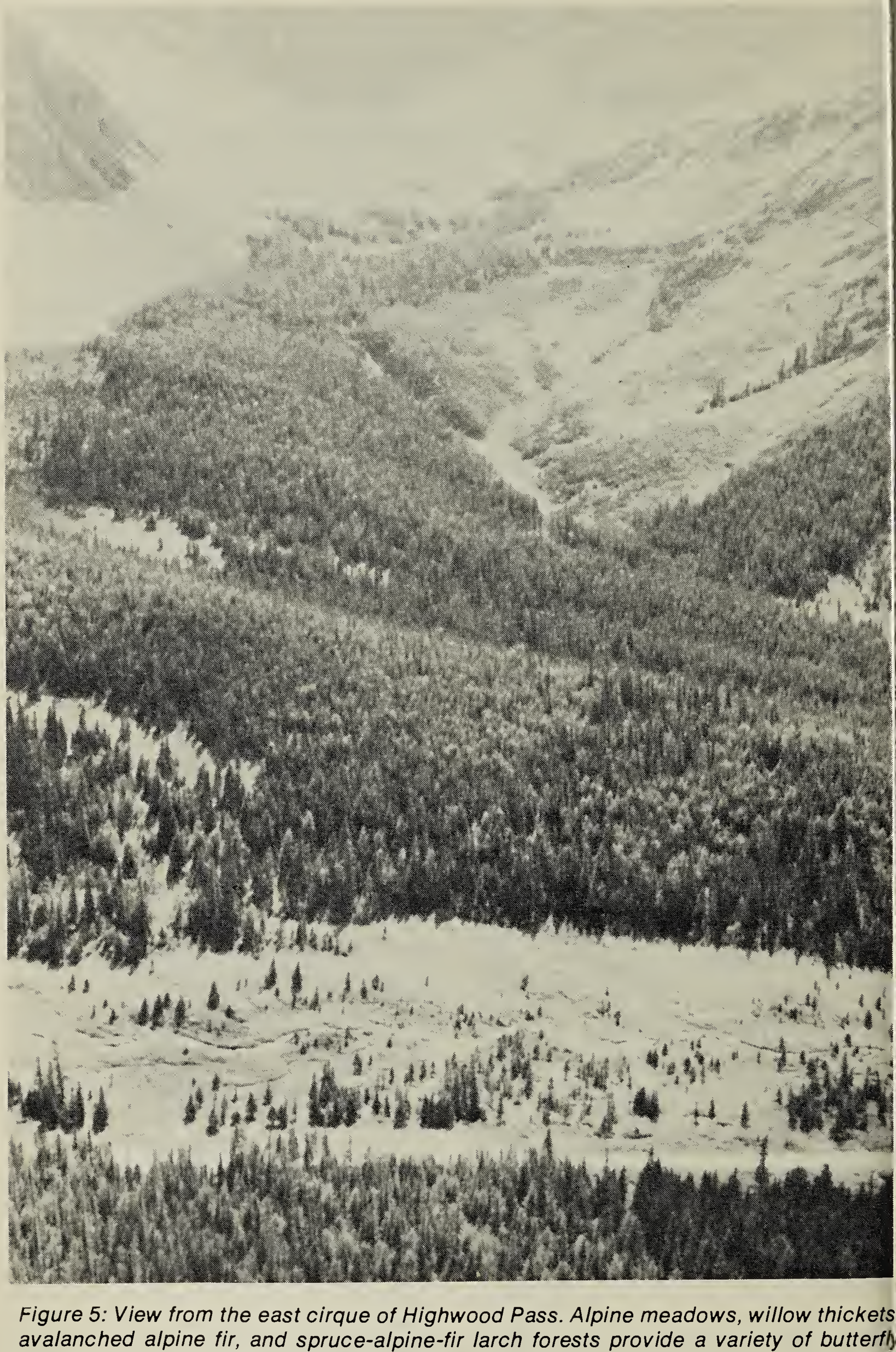

Figure 5: View from the east cirque of Highwood Pass. Alpine meadows, willow thickets, avalanched alpine fir, and spruce-alpine-fir larch forests provide a variety of butterfly habitats. Typical species of this area are Chryxus Arctic, Milbert's Tortoise-shell, Pelidne Sulphur, and Elis Sulphur.

TABLE 1: Comparison of Kananaskis Provincial Park and total provincial Rhopaloceran fauna.

FAMILY	**PARK**		**PROVINCE**	
	No. of Species	**Percent of Fauna**	**No. of Species**	**Percent of Fauna**
Hesperiidae	5	8%	27	17%
Papilionidae	2	3%	8	5%
Pieridae	13	22%	19	13%
Lycaenidae	9	15%	36	24%
Nymphalidae	23	39%	46	30%
Dandaidae	0	0	1	0.6%
Satyridae	7	12%	15	10%

other than isolated patches, can be used to explain the absence of Ringlets.

The elfins represent a more difficult problem. Apparently suitable patches of bearberry *(Arctostaphylos uva-ursi)* are widespread in the lower elevation lodgepole pine forests and should theoretically support Hoary Elfins and Brown Elfins. Caterpillars of the Western Pine Elfin have a limitless food supply in the large forests of lodgepole pine. Although admittedly conjectural, the absence of these species may be attributed to climate. The climatic climax forests of the areas currently occupied by lodgepole pine, are spruce-fir forests which are indicative of cool, moist conditions. Similarly the predominant understory plant of the pine forest is grouseberry *(Vaccinium scoparium)* — a plant usually associated with high elevations and indicative of cool, moist conditions.

Available information, although unbalanced, indicates greater variety and abundance of alpine butterflies on the shales of the Highwood Pass when compared with the limestones and dolomites that predominate in the more westerly portions of the park. However, this trend is supported by observations elsewhere in the mountains of Alberta.

The park has a relatively poor representation of the arctic-alpine tundra butterfly fauna recently studied by Pike[17]. This may be merely an artifact of the amount of research which has been conducted in the alpine zone. However, when one considers the amount and distribution of alpine tundra in the park, this may be a real situation. At best, the alpine tundra butterfly fauna of the park will be local in the small patches of such habitat which is available. Excessively steep slopes prevent establishment of rich alpine tundra vegetation which is required by some species and also severely constrains research. The highly calcareous bedrock which predominates in the park is not conducive to good growths of dark lichens and other plants which are a characteristic feature of fellfields that support good populations of species such as *Boloria alberta, Oeneis melissa,* and *Euphydryas editha.*

A large volume of recent research has shown that many ecosystems are dependent on or subject to relatively frequent fires. This is certainly true for the mountains of southwestern Alberta[9 13 19]. Butterflies are essentially herbivorous insects and insofar as fire determines the distribution of food plants in space and time, fire

TABLE 2: Butterfly phenology and elevations of four Alberta Areas.

AREA	**Flight Period (days)**	**Peak No. of Species**	**Peak Flight Period**	**Approximate Elevation (m)**
Calgary	200	45	mid-June	919 to 1,067
Banff National Park	165	46	mid-July	1,341 and up
Kananaskis Provincial Park	122	34	late July	1,615 and up
Plateau Mountain	85	28	early August	2,438

must be an important factor in butterfly ecology. A recent literature review of butterfly ecology by Gilbert and Singer[8] indicates that this concept has not been explored by lepidopterists. In Kananaskis Provincial Park, forest fires are especially important in creating the sunny, open habitats which support the greatest variety and most concentrated populations of butterflies. Fire also depresses treeline for a substantial time, thus providing additional alpine habitat for a number of species.

Other major influences on the park butterfly fauna are beaver activity, groundwater discharge, colluvial action, snow avalanches. All these factors, singly or in conjunction with fire provide a variety of non-forest habitats. With the exception of increased water levels in the Kananaskis Lakes, man has had relatively little widespread influence on the butterfly fauna. Linear clearings that result from powerline right-of-ways, trails, and old roads are actually superior places to observe butterflies since the insects apparently treat them as natural openings in the forest canopy.

In general, the park is poor butterfly habitat, similar to the situation reported by Tilden and Huntzinger[20] for Crater Lake National Park. Much of the park supports habitats foreign to good butterfly populations and variety: extensive coniferous forest with low plant species diversity and cool, moist microclimate; rock barrens; water; glaciers; and perennial snowbanks. Certain alpine areas such as Highwood Pass support relatively rich butterfly populations. At lower elevations, the most productive habitats are open meadows, shrublands, and sparsely treed to non-treed wetlands.

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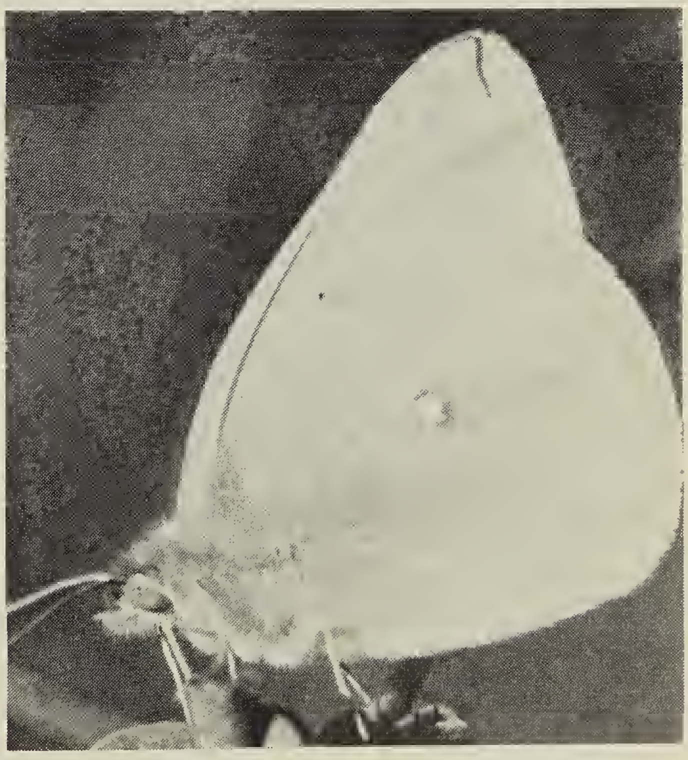

Alexandra Sulphur *C. R. Wershler*

A FLEA BEETLE THAT FEEDS ON THE COMMON PLANTAIN

LARRY BURGESS, Agriculture Canada Research Station, Saskatoon, Saskatchewan, S7N 0X2.

Flea beetles are a group of leaf-eating beetles with enlarged hind legs and the ability to jump vigorously when disturbed. In the Prairie Provinces, while there are several species of flea beetles that are serious pests of rapeseed crops, mustard crops, and gardens, there are other species that live on native plants and have a more harmonious relationship with man. An interesting flea beetle in the latter category is *Dibolia borealis* Chev. (Fig. 1), a shiny black, convex beetle about 3 mm long with a bronzy or bluish sheen, whose host plant is the common plantain, *Plantago major* L. Hartley Fredeen of Saskatoon first drew this insect to my attention as unidentified adult flea beetles he had discovered feeding on plantains near the Fenton ferry southeast of Prince Albert. Since then Ed Wiens and I have observed this beetle feeding on plantain growing along trails in cutover areas of the boreal forest near Montreal Lake, Saskatchewan, and along the South Saskatchewan River at Saskatoon. I also observed them this past spring at Kenosee Lake in the southeastern corner of the province. Parry reports specimens from Fish Lake, Saskatchewan (location undetermined).[3] A herbarium specimen of plantain collected from Maple Creek and in the Ralph C. Russell Herbarium of the Agriculture Canada Research Station in Saskatoon, contains leaf miner tunnels typical of *D. borealis,* and it is probable that this beetle occurs in Saskatchewan wherever the common plantain is present. To date in Saskatchewan I have seen *D. borealis* only on the common plantain, but further observations are necessary, as it has been found in Ontario that this beetle will feed and lay eggs on several plantain species.[1]

Horn reported that *D. borealis* was widely distributed over the entire eastern United States and Canada, and also mentioned that one specimen in his collection was from Nevada.[2] Parry, in a taxonomic revision of the genus *Dibolia* in America north of Mexico, examined specimens from the eastern half of United States and one from Montana, and from Alberta to Prince Edward Island and Nova Scotia in Canada.[3]

The life history of this beetle at Ithaca, New York, was described in detail by Helen Reed in 1927.[4] In Saskatchewan, adult beetles are to be seen in May and June feeding on the surface of plantain leaves, with the feeding scars often developing into holes right through the leaves (Fig. 2). Each egg is laid in an individual depression chewed into the leaf surface, and upon hatching in late June or July, the minute larvae burrow into the leaves and become leaf miners. The tunnels created by the larvae between the two leaf surfaces are conspicuous and the larvae can often be seen within them (Fig. 2). After moulting twice the larvae leave the leaves and enter the ground where they pass through prepupal and pupal stages in small

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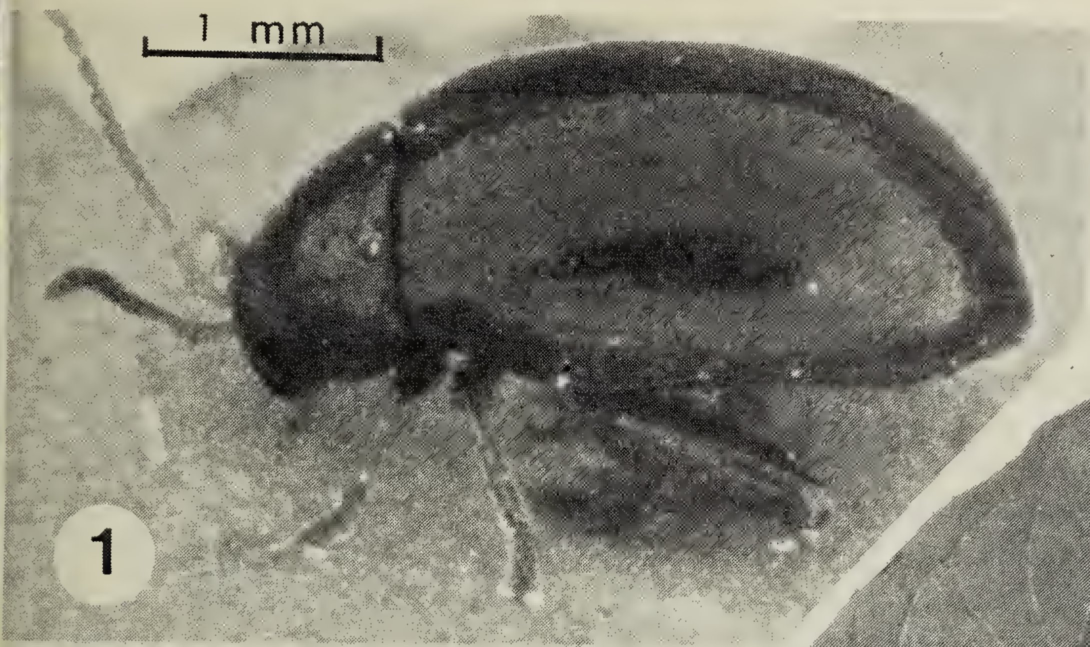

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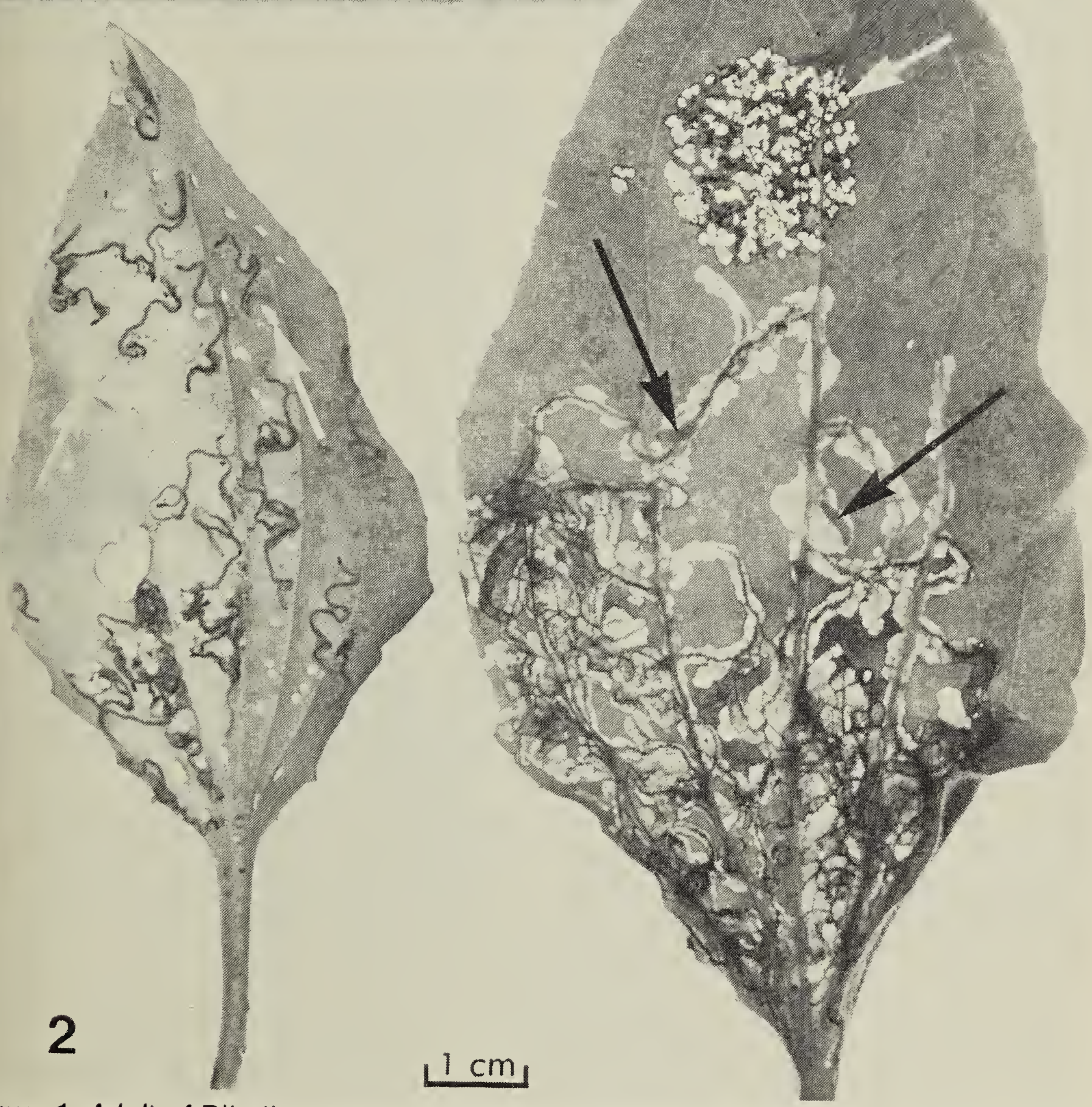

Figure 1. Adult of Dibolia borealis *feeding on a plantain leaf.*

Figure 2. Two plantain leaves showing larval tunnels, larvae (black arrows), and holes and feeding scars (white arrows) caused by feeding by adult D. borealis. *The circular patterns of feeding scars near the tip of the larger leaf was caused by the adult beetles being confined to a glass vial.*

Ralph E. Underwood

earthen cells, and from whence the next generation of adult beetles emerge later in the summer.[4] Reed believed that there was only a single generation per year in New York State, and the same situation is almost certainly true here, as is the case for all other flea beetle species we have studied in Saskatchewan. *D. borealis* is believed to overwinter as an adult and to become active again the following spring.[4] We have not found any overwintering adults of *D. borealis* in extensive winter sampling of leaf litter and turf in the groves of trees that dot the Saskatchewan parkland although many overwintering adults of some other flea beetle species have been found in this habitat. Wilcox says that in Ohio adults of *D. borealis* may be found hibernating under the loose bark of sycamore trees.[5] Perhaps they overwinter in some similar habitat here, but as such habitats would be exposed to extreme winter temperatures perhaps they merely enter the soil or turf in the vicinity of plantains and thus pass the winter beneath a covering of snow. The few soil samples we have examined from around plantains in the fall have yielded no overwintering adults, and more sampling is needed.

Plantain leaves seem to withstand tunnelling and feeding by the beetles remarkably well; even a leaf as heavily damaged as that in Fig. 2 was still green and turgid at the apex. This is probably because both larval and adult feeding seem to leave the leaf veins more or less intact. This insect thus has a good parasitic relationship with its host plant in that it does not readily kill the plant and thus decrease its own chances of future survival.

Acknowledgements

I wish to thank Mr. J. E. Wiens for his assistance in these observations and Dr. D. G. Bright of the Biosystematics Research Institute, Agriculture Canada, Ottawa for identifying representative specimens. I also thank Mr. Ralph E. Underwood for his kindness in taking the photographs.

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COLIAS CHRISTINA HABITAT DESTROYED AT THE PAS, MANITOBA

WALTER V. KRIVDA, P.O. Box 864,
The Pas, Manitoba.

I wish to put on record that the only substantial local colony of the native orange sulphur, *Colias christina* has been destroyed this summer by bulldozing, together with stands of its native food plant *Hedysarum alpinum* var. *americanum.*

This colony was 2.5 miles East of The Pas by Grace Lake. It occurred along clay ditches bordering on sphagnum bogs. The food plant occurred over almost pure clay. It stood 2-3 feet high, with racemes of pink flowers in June. These plants were perennial.

From 1951 onward I collected this fine sulphur here almost each year. Duplicate specimens were sent out to various collectors throughout the world. Over 100 specimens were taken in the twenty-seven year period. The adults could always be taken on July 1st. New larvae occurred singly, one to a plant, and had a characteristic rosy band running parallel to the feet. The young branches and stems of the food plant are also rose-wine coloured. This is a good instance of protective colouration. Another area, 25 miles North on Highway 10 from The Pas, has colonies of the food plant. These also occur in clay near to Jack Pine trees and bogs not too far away. I do not have any records of *C. christina* from this particular area. The presence of the food plant may not necessarily assure the presence of the sulphur. Possibly a certain sized colony of the food plant is needed to attract the establishment of the butterfly.

A prairie sky

J. B. Gollop

THE PIPING PLOVER IN SASKATCHEWAN: A STATUS REPORT

WAYNE E. RENAUD, LGL Ltd. — environmental research associates, 4
Eglinton Ave. West, Toronto, Ontario M4R 1A1, GUY J. WAPPLE, Box 1153
Biggar, Saskatchewan S0K 0M0, and DURAND W. EDGETT, 628 Church St.
Apt. 4, Toronto, Ontario M4Y 2G3.

The Piping Plover is the only small plover that breeds in a large area of southern Canada and the northern United States. Its breeding range is divided, probably by habitat availability, into three areas: the Atlantic coast from Virginia to Newfoundland, the Great Lakes, and the western plains from central Alberta and Manitoba to Nebraska.[2] The Piping Plover nests in a variety of habitats including ocean beaches, sand dunes, river bars, and the shores of lakes, alkaline sloughs and reservoirs.

During the past 100 years, the Piping Plover has experienced population declines over a large portion of its range. In the late 1800's, spring hunting in New England greatly reduced the numbers of Piping Plovers breeding along the Atlantic coast.[11] This practice had largely ceased by the early 1900's, and their numbers slowly increased. The effect of spring hunting on the western population is not known, but was probably small, since most Great Plains breeders apparently migrate through the Central Flyway from wintering areas along the Gulf Coast.[32] In the New England States, the Canadian Maritimes and along the Great Lakes, a second decline became evident by the 1960's and 1970's. The Piping Plover has been included on the National Audubon Society's "Blue List" of threatene species since its inception in 1972.[3-

This paper briefly summarizes th species' status in Canada, an brings together all existing information on its occurrence in Saskatchewan.

Status in Canada

Declines since the 1930's hav been most severe along the Grea Lakes. In the late 1800's and earl 1900's, Piping Plovers nested alon the Canadian shorelines fron Kingston to the Bruce Peninsula.[2] The largest breeding population wa apparently at Long Point, a 29-km long peninsula on the north shore o Lake Erie. Snyder estimated that a least 100 pairs nested there in 1930 and Sheppard counted up to 5 adults in one day during Jul 1935.[40] [39] Numbers at Long Poin declined during the 1960's an 1970's.[15] [26] In 1977 only one pai nested (Gary Miller, pers. comm.) and in 1978 no nests were foun during systematic surveys by Lon Point Bird Observatory personne (Ann Lambert and Erica Nol, pers comm.). Long Point was the las location along the Great Lake where Piping Plovers were known t have nested. In the adjacent Unite States, small numbers still nest alon the Great Lakes in Minnesota,[23] [4 Wisconsin,[43] and Michigan.[33]

Declines in the Canadian Great Lakes population have been generally attributed to summer cottage development and recreation.[16] However, at Long Point human disturbance is confined to a small area even during the summer. Bradstreet *et al.* and Gary Miller (pers. comm.) suggest that rising lake evels and associated habitat destruction may, in part, account for the observed decline.[12] Another possible factor is greater predation from a four-fold increase in the numbers of summering gulls[26] (Michael Bradstreet and Chip Weseloh, pers. comm.).

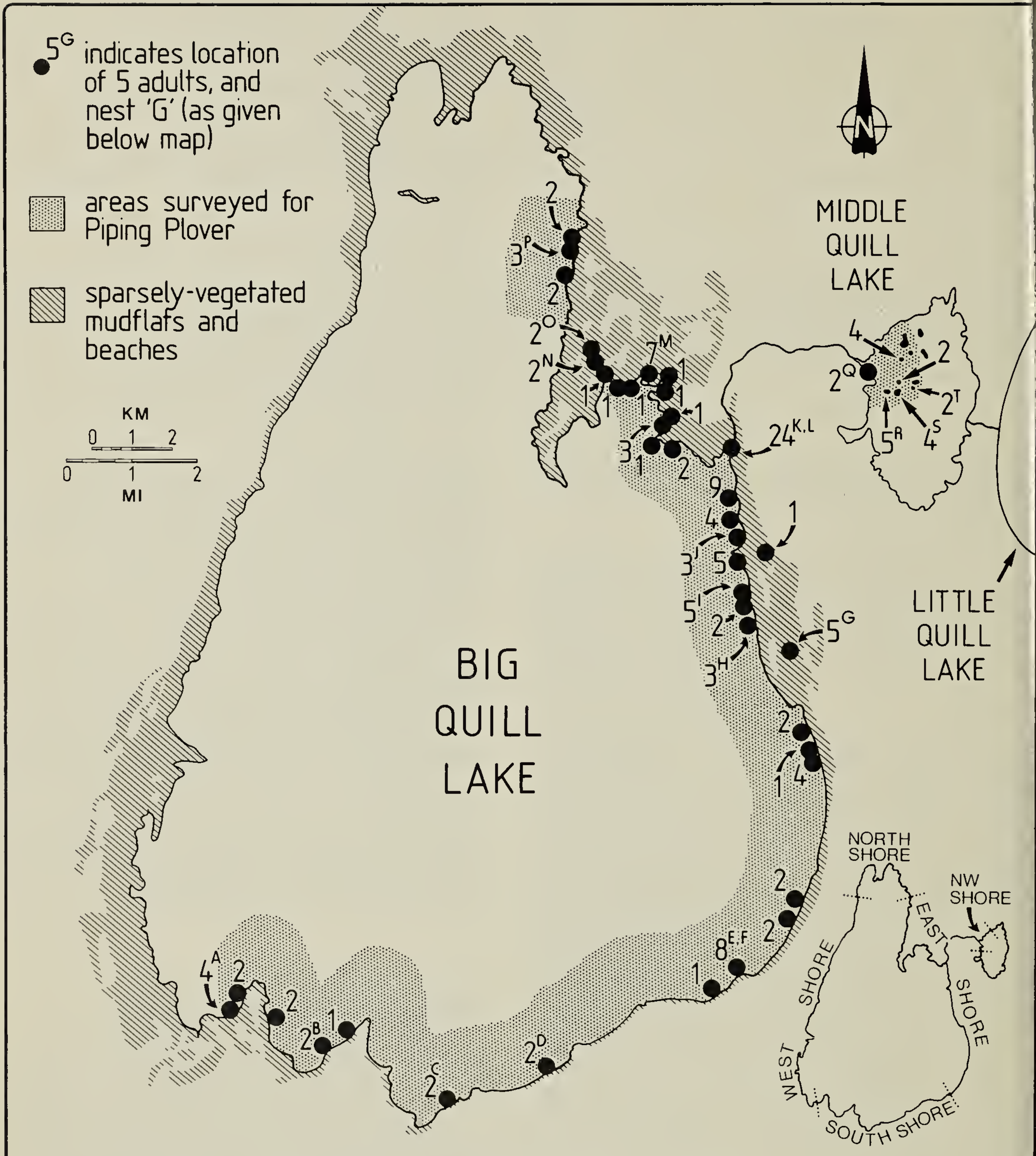
In the Maritime Provinces, Piping Plovers are still common on a few isolated beaches. In 1975 and 1976, Cairns studied a population of 27 to 29 pairs on a 1.6-km-long spit in southern Nova Scotia.[13] However, the total population of Newfoundland, Nova Scotia, Prince Edward Island, the Magdalen Islands, and eastern Quebec is thought to number only 300 to 350 breeding pairs (Winifred Cairns and Ian McLaren, pers. comm.). None now nest on the north shore of the Gulf of St. Lawrence (Cairns and McLaren, pers. comm.) or on the Gaspe Peninsula (D. David n Arbib 1976). The species also no onger nests on Sable Island where Macoun and Macoun found them common at the turn of the century.[13 29] The decline along the Atlantic coast is believed to be the result of many factors including 1) recreational disturbance on beaches, 2) greater predation by several species of animals, including gulls, crows, foxes and racoons all of which have increased as result of human influence, and 3) fluctuations in the amount of beach habitat available due to instability of the dynamic dune and barrier beach systems (Cairns and McLaren, pers. comm.).

The Great Plains population is the least known, although its approximate range has been well-defined for several decades.[2 19 37] No published population estimates are available for Manitoba, Saskatchewan or Alberta. In Manitoba, Piping Plovers nest most regularly on the extensive sandy beaches and islands of Lakes Manitoba, Winnipeg and Winnipegosis and at Shoal Lake east of Woodlands (Herb Copland, pers. comm.). In Alberta, Piping Plovers have been recorded nesting on eight lakes[28]; population estimates are available only for Dowling Lake, which was completely censused in 1977 by Chip Weseloh (pers. comm., report in prep.).

In Saskatchewan, little quantitative information has been published since Piping Plovers were first reported at Deep Lake near Indian Head in 1892.[29] Up to 1973, nesting had been suspected or verified at 20 localities[34], but until 1978 no population estimates were available for any of these locations.

A Survey of the Quill Lakes

In June 1978, we undertook a survey of part of the Quill Lakes (51°53′N, 104°15′W) in south-central Saskatchewan. This area was chosen for two reasons: 1) it contains one of the largest, if not *the* largest, breeding populations of Piping Plovers in the province, and 2) some quantitative information on the species' status is available for 1909.[17] While on a collecting expedition for the Field Museum of Natural History in Chicago, John F. Ferry spent 9 June to 11 August 1909 exploring the Quill Lakes. He listed the Piping Plover as "common" and "distributed along the south shore of [Big] Quill Lake in the proportion of about one pair of birds to the mile."


5G indicates location of 5 adults, and nest 'G' (as given below map)
areas surveyed for Piping Plover
sparsely-vegetated mudflats and beaches
KM
0 1 2
0 1 2
MI
N
MIDDLE QUILL LAKE
BIG QUILL LAKE
LITTLE QUILL LAKE
NORTH SHORE
NW SHORE
EAST SHORE
WEST SHORE
SOUTH SHORE

NESTS AND BROODS (N=nest, B=brood, e=egg, y=young)

A - B1y	E - B1y	I - B1y	M - B4y	Q - N5e
B - B1y	F - B2y	J - B1y	N - B2y	R - N1e,2y
C - B1y	G - N4e	K - B1y	O - N4e	S - N3e
D - B2y	H - N4e	L - B3y	P - N4e	T - N1e

Figure 1: Distribution of Piping Plover adults, broods and nests at the Quill Lakes, Saskatchewan, June 19-21, 1978.

METHODS: On 19, 20 and 21 June 1978 we walked 2.9 km (1.8 mi) of shoreline and, in addition, surveyed 8 islands in Middle Quill Lake, and walked 40.5 km (25.3 mi) of shoreline along Big Quill Lake (Fig. 1).

Shoreline positions were mapped and lengths were measured from aerial photographs taken in 1966* when levels appeared to be similar to 1978. One or two observers on foot followed the shoreline, and stopped at intervals to listen and scan with binoculars. In some areas where unvegetated mudflats extended for more than ½ km from the shoreline we made attempts to survey adjacent areas, hence the observations of some plovers up to 800 m from the shoreline proper. However, because of time constraints most of our time was spent surveying the area immediately adjacent to the shoreline, and some adults were probably missed. Since our main objective was to determine the size of the adult population, minimal time was spent ooking for nests and broods and many of these were undoubtedly missed.

RESULTS: The numbers of adults, broods and nests located are given n Figure 1; the numbers of adults are summarized in Table 1. Notes on other species appear in the Appendix.

We observed 145 adults, 8 nests and 12 broods. Adult densities averaged 1.3 per linear km (2.1/lin mi) of shoreline along the south shore, and 4.6 per lin km (7.4/lin mi) along the east shore of Big Quill Lake (see Fig. 1 for shoreline designations). Most of the 19 Piping Plovers observed at Middle Quill Lake were on islands; the density along the northwest lakeshore was .7 per lin km (1.1/lin mi).

Most Piping Plovers were seen ingly or in pairs; usually where more han two were seen in the same area, here was much calling and displaying. Nothing that appeared to be a non-breeding flock was observed. The largest group consisted of six adults and three chicks (Fig. 1 — brood 'L'). All other broods were accompanied by one or two adults. Most chicks were estimated to have been from 7 to 10 days old.

DISCUSSION: The density of Piping Plovers along the south shore of Big Quill Lake in 1978 was about one pair per mile of shoreline, similar to that reported by Ferry in 1909. Ferry's figure was an approximation, not an actual census, but we can probably conclude that no great change in numbers has occurred along the south shore during the past 69 years.

The water level of the Quill Lakes has dropped substantially since 1909 (see Wynyard 72P/16 map sheet; 1:50,000 scale for shoreline fluctuations); probably the greatest change since that time occurred during the drought of the 1930's. This drop in water level appears to have had little effect on the position of the south shore which has a relatively steep shoreline gradient. However, along most other shorelines on Big Quill Lake, the land/water interface has retreated from 1 to 5 km, exposing large, sparsely-vegetated, alkaline flats. Possibly, the newly-exposed mudflats now provide more favourable Piping Plover habitat than was present in 1909 when the lake was higher and less alkaline. The marked variability in habitat now existing on Big Quill Lake probably accounts for the different densities of Piping Plover found along the south *vs* east shore.

In an attempt to estimate numbers of Piping Plovers at Big Quill Lake, we mapped sparsely-vegetated habitats from 1966 aerial photographs. The extent of sparsely-vegetated areas along the north and west shores was similar to that along

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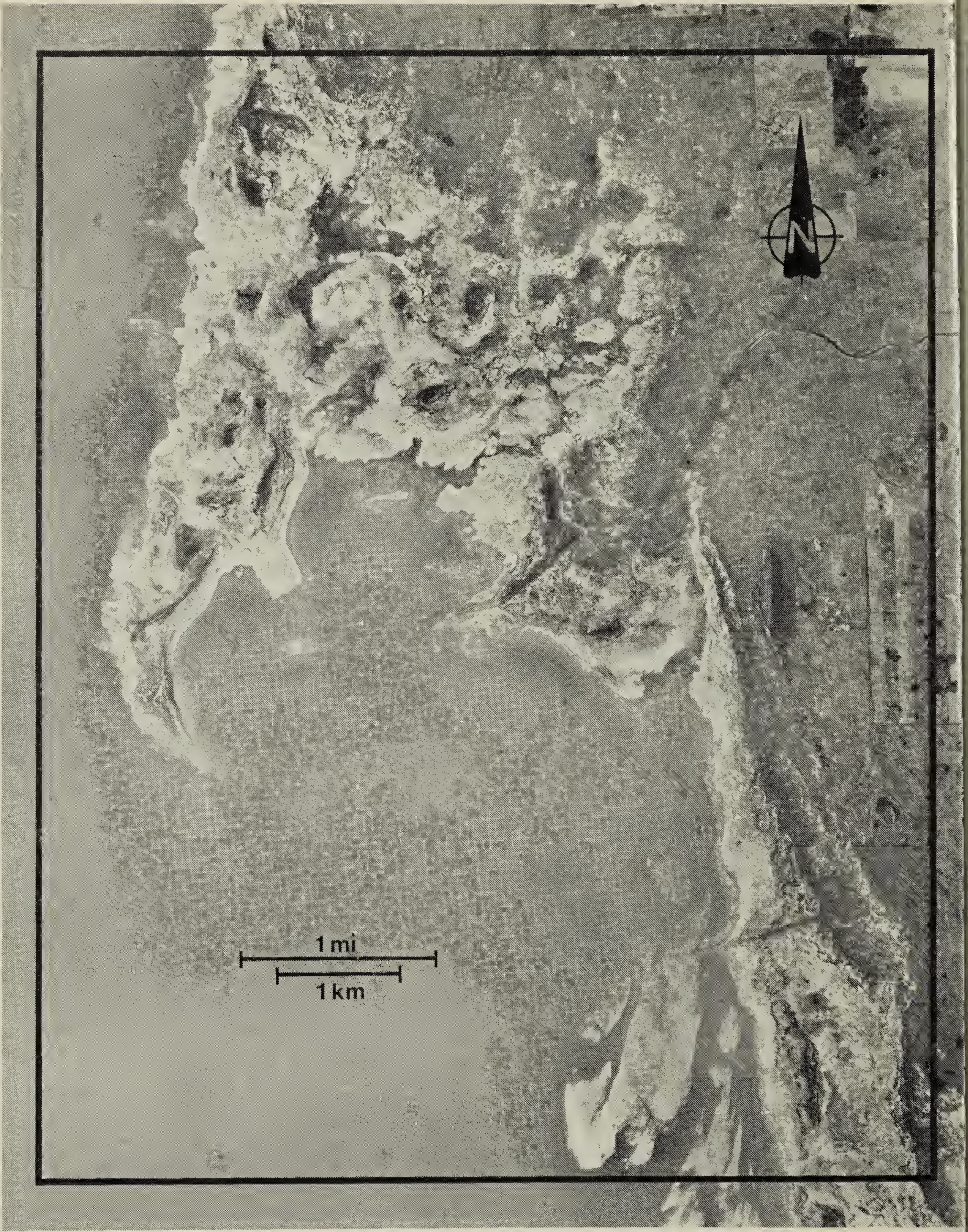
Photos A19678:66-73, 168-174, 251; 1:57,000 scale, National Air Photo Library, Ottawa.



Aerial photograph of the east shore of Big Quill Lake, 1966. The poorly-vegetated alkaline flats where Piping Plovers were most numerous in 1978, appear white or ligh grey on the photograph.

(Photo A19678-68, National Air Photo Library, Ottawa.

the surveyed east shore; hence our density for the east side was extrapolated to these other areas of Big Quill Lake. An estimate of 337 adults was obtained (Table 1). This estimate excludes any that may nest on the large island near the north end of Big Quill Lake or any missed because our surveys concentrated on the shoreline interface.

TABLE 1. Densities and population estimates of adult Piping Plovers at Big Quill and Middle Quill Lakes, June 1978.

Area:subarea	**Length of Shoreline (km)**[1]	**Length Surveyed (km)**	**Piping Plovers**		**Estimated No. Present**
			No. Seen	**Density (no./km)**	
Big Quill: S shore	18.5	18.5	24	1.3	24
E shore	30.5	22.0	102	4.6	140
N & W shore	37.5	—	—	4.6[2]	173
Middle Quill: islands	(10 islands)	(8 islands)	17	—	17
NW shore	2.9	2.9	2	0.7	2
all other shorelines	12.5	—	—	0.7[3]	9
					28
Total estimate (Big Quill + Middle Quill Lakes)					365

[1] A linear kilometer (lin km) as referred to here, and in the text, is the length of the shoreline including major indentations.

[2] Extrapolated from density along E shore; see text.

[3] Extrapolated from density along NW shore; see text.

Based on similar procedures, the population of Middle Quill Lake was estimated as 28 adults (19 were actually observed). It seems probable that few, if any, nested on the two small gull nesting islands that we failed to visit.

No survey was conducted on Little Quill Lake in 1978. Aerial photographs indicate that the shoreline is much better vegetated and more abrupt with few beaches or alkaline flats. Renaud saw no Piping Plovers along the south shore, an area largely overgrown with foxtail, during July 1973; and Bob Godwin (pers. comm.) saw none along the lakeshore during CWS banding activities in July 1977. In fact, to our knowledge there have been no observations of Piping Plovers at Little Quill Lake. Probably few, if any, nest there.

Hence, we estimate that a population of 350 to 400 adults inhabited the Quill Lakes in 1978. A survey of the north and west shore of Big Quill Lake would verify whether densities in these areas are as high as suspected.

The Status of the Piping Plover In Saskatchewan

The Piping Plover is a rare transient in southern Saskatchewan in areas away from the breeding sites; most records consist of single individuals seen alone or in flocks with other small shorebirds. Macoun and Macoun found Piping Plovers "common" in migration at Deep Lake (a breeding locality) in late May 1892 but no more recent spring concentratons have been observed.[29] The largest "fall" group, consisting of 43 adults (probably a post-breeding or non-breeding flock), was recorded at Middle Quill Lake on 5 July 1972.[34] Five individuals at Porter Lake east of Saskatoon on 10 July 1971 was the largest group recorded at a non-breeding locality.[21]

Principal dates of occurrence in the province are early May to mid-

Adult Piping Plover feigning a broken wing, Cavendish sandspit, Nova Scotia.
Winnifred Cairns

August, and extremes are 22 April[35] and 1 October.[9] Dates of 43 nests ranged from 23 May to 14 July (both extremes with 4 eggs and tending adults).[34] The peak of incubation appears to be from late May to mid-June. The dates of 24 flightless broods ranged from 19 June (this paper) to 10 August.[22] Some of the young seen on 19 June 1978 were estimated to have been at least 10 days old, suggesting that full clutches may be expected as early as the 3rd week of May and young by the 2nd week of June. The young observed on 10 August 1967 were downy; probably flightless young occur in some years until the 3rd week of August.

Renaud summarized the Saskatchewan breeding records up to 1973; seventeen additional breeding areas have been identified, no doubt a result of more thorough coverage of potential habitat rather than an increase in numbers.[34] All records through 1978 are given in Fig. 2 and Table 2.

Although observations at most breeding localities in Saskatchewan have been far from systematic, there is some evidence that populations may shift unpredictably from year to year. In the Sarnia Beach area of Last Mountain Lake, Piping Plovers were "very common breeders" in 1975, but were entirely absent in the same area during investigations in 1976 and

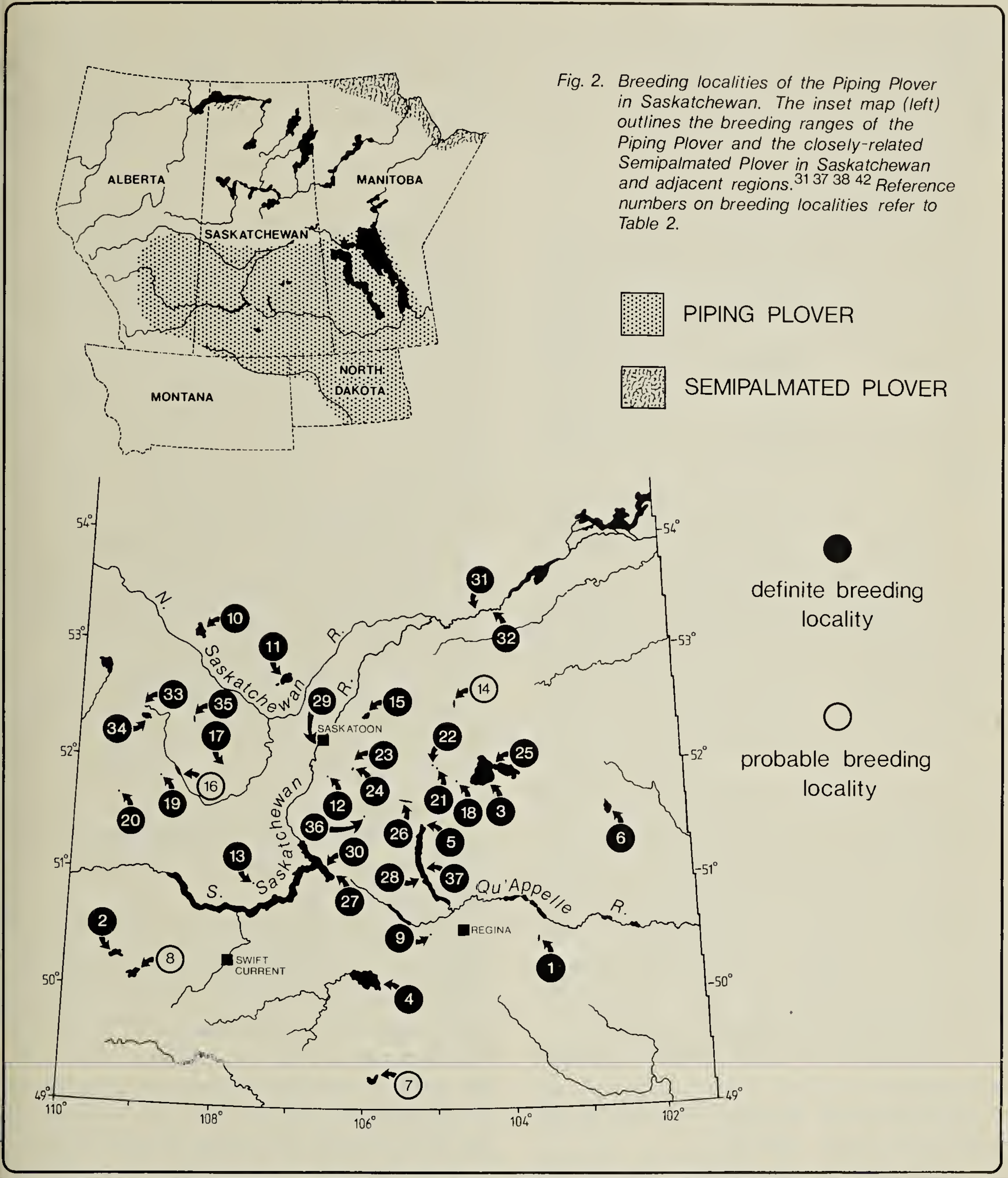


Fig. 2. Breeding localities of the Piping Plover in Saskatchewan. The inset map (left) outlines the breeding ranges of the Piping Plover and the closely-related Semipalmated Plover in Saskatchewan and adjacent regions.[31 37 38 42] Reference numbers on breeding localities refer to Table 2.

1978[24] (David Hatch, pers. comm.). In all three years (1975, 1976 and 1978), Hatch considered Piping Plovers present in "good number" at the north end of Last Mountain Lake, and the species nested on the east side of the lake NE of Sarnia Beach in 1978 (Dale Hjertaas, pers. comm.). An unnamed lake 23 km SE of Biggar was used by a pair of Piping Plovers during only two years (1972 and 1978) from 1968 to 1978 although the lake contained some water during May and June each year (Renaud, pers. obs.).

At other localities, the Piping Plover may be a regular breeder. C. Stuart Houston (pers. comm.) observed Piping Plovers annually on the islands in Redberry Lake during bird-banding trips from 1964 to 1978. At Big Quill Lake, Piping Plovers were

TABLE 2. List of breeding localities of the Piping Plover in Saskatchewan. Records are mapped in Figure 2. Breeding records previously summarized in Renaud (1974) are listed here, but refer to the original source for full details. [Asterisks (*) denote new breeding localities; question marks (?) denote probable but not definitely proven breeding localities; PNRS = Prairie Nest Records Scheme, N = nest, e = egg, yng = young; wk = week].

1. DEEP LAKE. Nest, 1892.[29]
2. BIG STICK LAKE. Brood, 1906.[10]
3. BIG QUILL LAKE. Nest, broods, 1909.[17] Renaud (1974) overlooked a record by Todd who collected 2 yng 6 km E of Dafoe on June 20/47 and stated that Piping Plovers were "common".[44] See also this paper.
4. OLD WIVES LAKE (= LAKE JOHNSTONE). Breeding.[30] Probably breeding, 1969.[45]
5. N END OF LAST MOUNTAIN LAKE. Nest, brood, 1932.[44] Probably breeding, 1969.[1] N5e, June 12/75; brood of 3 yng, July 11/75 (Cliff Matthews, Canadian Wildlife Service—PNRS). Brood of 2 yng, small island off Perry's Point, July 21/78 (J. R. Caldwell and C. Jorgenson *fide* J. B. Gollop). "Good numbers breeding in 1976, 1977 and 1978" (David Hatch, pers. comm.).
6. GOOD SPIRIT LAKE. Nesting, 1936.[8] Disappeared as a breeder in 1950's (W. J. Anaka, pers. comm.).
7. FIFE LAKE? 2 adults seen, June 1940.[41]
8. CRANE LAKE? 3 adults seen, June 1948.
9. STONY BEACH LAKE. Nest, 1959 (Belcher 1961, PNRS).
10. JACKFISH LAKE. Nest, 1963.[34]
11. REDBERRY LAKE. 30 yng banded, 1964-1973.[34]
12. STREHLOW POND, 11 KM N OF DUNDURN. Nest, 1966.[20]
13. UNNAMED WATERBODY NEAR CLEARWATER LAKE. Brood, 1967.[22]
14. RANCH LAKE? Probably breeding, 1972.[14]
15. BUFFER LAKE. Nest, 1972.[34]
16. OPUNTIA LAKE. Adult feigning broken wing, 1972.[34]
17. UNNAMED LAKE, 27 KM SE OF BIGGAR. Nest, 1972.[34] N4e, June 18/78 (Renaud, pers. obs.).
18. *JANSEN. 4+ family groups, all with yng capable of flight, July 24-25/72 (David Hatch, pers. comm.).
19. *UNNAMED WATERBODY, 2.5 KM NW OF DODSLAND. Pair with 2+ yng, less than 1 wk. old, on dry slough bottom, July 14/72 (David Hatch, pers. comm.).
20. *UNNAMED WATERBODY, 8 KM N, 1.5 KM E OF SMILEY. N4e, 2 other pairs with broods, July 14/72 (David Hatch, pers. comm.).
21. *UNNAMED WATERBODY, 6.5 KM NE OF LANIGAN. Pair with a newly-fledged brood, July 20-21/72 (David Hatch, pers. comm.).
22. *ATTICA. Pair with 4 yng, July 21/72 (David Hatch, pers. comm.).
23. UNNAMED WATERBODY, 8 KM N OF BRADWELL (AT BLUCHER). Nest, 1973.[34]
24. BRADWELL RESERVOIR. Nest, 1973.[34]
25. MIDDLE QUILL LAKE (= MUD LAKE). Nest, 1973.[34] See also this paper.
26. *LITTLE MANITOU LAKE, NEAR WATROUS. Nesting was noted in 1974, 1976 and 1978. At least 22 pairs and 8 nests (7 with 4e; 1 with 3e + 1 yng), June 29/78 (David Hatch, pers. comm.).
27. *AIKTOW, LAKE DIEFENBAKER. Two nests, each with 4e, 1 km apart, June 16/74.[36]
28. *SARNIA BEACH, LAST MOUNTAIN LAKE. "Very common nesting species in 1975 with one island containing 4 nests (July 1)"[24]; none nested in any of these areas during investigations in 1976 and 1978 (David Hatch, pers. comm.).
29. *SOUTH SASKATCHEWAN RIVER AT SASKATOON. N4e on sand bar in river 1.5 km S of Queen Elizabeth Power Station, June 6/75 (Bob Godwin, pers. comm.).
30. *DOUGLAS PROVINCIAL PARK, LAKE DIEFENBAKER. N4e, on a cobble beach, June 11/75 (Gary Anweiler, pers. comm.). N4e, June 8/77 (Sheila Lamont, pers. comm.).
31. *SASKATCHEWAN RIVER, 2 KM W OF GRONLID FERRY. N4e on rocky beach of island, June 20/76 (Bob Godwin, pers. comm.).
32. *SASKATCHEWAN RIVER, 14 KM E OF GRONLID FERRY. Pair with 3 yng on sandbar, June 22/76 (Bob Godwin, pers. comm.).
33. *KILLSQUAW LAKE. 4 adults with 2 yng (3 days old), June 25/78 (Renaud,

pers. obs.).

34. *MUDDY LAKE, S OF UNITY. Pair with 3 yng (2 wks. old), June 25/78 (Renaud, pers. obs.).

35. *AROMA LAKE. 23 adults with 6 yng (2 wks. old), June 25/78 (Renaud, pers. obs.).

36. *UNNAMED WATERBODY, 22.5 KM E OF KENASTON. 2 nests, each with 4e, June 20/78 (David Hatch, pers. comm.).

37. *LAST MOUNTAIN LAKE (S18-T24-R23-W2M). N4e, 2 pairs present, June 17/78 (Dale Hjertaas & Paule Brochu, pers. comm.).

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considered common in 1909[17], 1947[44], and 1978 (this paper), the only years when the shoreline avifauna was assessed in detail.

Unlike Piping Plovers along the Atlantic coast and in the Great Lake region, the majority of the Piping Plovers in Saskatchewan nest on alkaline and salt lakes, most of which have received little human disturbance. However, on fresh-water lakes and some deep salt lakes where provincial and regional parks are located (e.g., Jackfish Lake, Redberry Lake, Little Manitou Lake), the species will become increasingly threatened by recreational activities. Those plovers nesting at Diefenbaker Lake and on sandbars in the Saskatchewan Rivers are subject to sudden changes in water levels during incubation, due to sudden releases of water from Gardiner Dam. For Piping Plovers that nest on small alkaline lakes, periodic drought may be the most important factor presently limiting numbers. In spite of these seemingly detrimental influences, the Piping Plover has shown its ability to colonize man-made habitats (e.g., Bradwell Reservoir, Diefenbaker Lake, probably Opuntia Lake).

There appears to be no definite indication that the numbers of Piping Plovers in Saskatchewan have declined drastically during recent decades. The Quill Lakes population is likely at least as numerous as it was in 1909. The fact that 22 of the 33 known breeding localities (Table 2) were discovered since 1970 indicates that the species is still widely distributed in southern Saskatchewan. Of the six localities identified as breeding sites prior to 1950, only two areas are thought to have been abandoned: Big Stick Lake due to drought[18] and Good Spirit Lake due to high water levels (William J. Anaka, pers. comm.). The species still breeds at Big Quill Lake, Last Mountain Lake and Old Wives Lake. Its present status at Deep Lake is unknown.

While it is still impossible to accurately estimate the Piping Plover population of Saskatchewan, it appears to be substantial and, with the possible exception of Manitoba, Saskatchewan may contain the largest number of any province in Canada. It seems probable, in view of the hundreds of kilometers of shoreline habitat available on as yet uncensused alkaline and salt lakes in Saskatchewan, that the Quill Lakes support less than a third of the total provincial population. A population of 1,000 to 1,500 adults, some portion of which are likely nonbreeders, may be a reasonable estimate. More extensive surveys of prime habitat could provide a more reliable population estimate for this unique member of our prairie avifauna.

Summary

During a survey of parts of Big Quill and Middle Quill Lakes on 19-21 June 1978, 145 adult Piping Plovers were recorded; an estimated 350 to 400 adults inhabitated the area. A density of approximately one pair per linear mi of shoreline was observed along the south shore of Big Quill Lake in 1978; a similar density was reported here in 1909. Numbers of

Piping Plover chicks about one day old, Cadden, Queens County, Nova Scotia. Note the egg tooth on the bill of the middle chick. *Winnifred Cairns*

Piping Plovers at the Quill Lakes have probably not declined during the intervening 69 years.

Extreme dates of occurrence in Saskatchewan are 22 April and 1 October; usually present from early May to mid-August. Egg dates range from 23 May to 14 July. Flightless young may be present from the 2nd week of June until the 3rd week of August.

Breeding habitats include river bars and the shorelines of alkaline lakes, freshwater lakes and manmade reservoirs. There is no evidence that Piping Plovers have declined province-wide in this century, but factors such as increased recreational activities on freshwater and some deep salt lakes, rising water levels on major rivers and on Diefenbaker Lake during the breeding season, and drought on small, alkaline lakes probably limit populations in some areas. Populations may shift unpredictably in some areas from year to year (e.g., Sarnia Beach, Last Mountain Lake). The future security of the Saskatchewan population lies in its extensive utilization of large, undisturbed salt and alkaline lakeshores.

Acknowledgements

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Appendix. Notes on Other Species

While conducting the Piping Plover survey from 19-21 June 1978, we recorded a total of 88 species of birds. Here we have included details on all shorebirds, Sandhill Crane and five colonial nesters; other species are listed below. The observations of migrant shorebirds are of interest since our visit fell within a period when Arctic breeding shorebirds are generally assumed to be absent from southern Saskatchewan.

WHITE PELICAN. On 19 June about 100 pairs were found nesting on a small island in Middle Quill Lake. Nests contained eggs and young to about 1 week old. Pelicans were seen soaring over Big Quill Lake on 20 June (45 in 3 flocks) and 21 June (flock of 25).

DOUBLE-CRESTED CORMORANT. 19 June: 30 pairs nested on the periphery of the pelican colony; 10 nests contained from 2-4 eggs each, the others contained young up to 7 days old. 20 June: 2 flew over the SW corner of Big Quill Lake.

SANDHILL CRANE. 20 June: groups of 2 and 3 individuals along the S shore, and a single crane along the NE shore of Big Quill Lake. All were feeding along mudflats and were apparently non-breeders or failed breeders.

KILLDEER. A total of 150+ were seen during the 3 days; although several pairs performed distraction displays, no nests or young were seen.

BLACK-BELLIED PLOVER. 19 June: 6 on shoals in Middle Quill Lake. 21 June: a total of 15 scattered along the E shore of Big Quill Lake.

RUDDY TURNSTONE. 19 June: 2 at Middle Quill Lake. 20 June: 24 along the S and SE shores of Big Quill Lake. 21 June: 8 along the E shore of Big Quill Lake.

UPLAND SANDPIPER. 19 June: 1 near the NW shore of Middle Quill Lake. 21 June: 1 near the NE shore of Big Quill Lake.

SPOTTED SANDPIPER. 20 June: a pair on a small rocky pond near the S shore of Big Quill Lake. Apparently absent from the alkaline shore of the lakes.

WILLET. A total of 117+ adults was seen; two broods noted on 21 June. The largest flock was of 15 on 20 June.

RED KNOT. 19 June: 2 feeding with 3 Black-bellied Plovers and 2 turnstones at Middle Quill Lake.

WHITE-RUMPED SANDPIPER. 20 June: a flock of 10 along the E shore of Big Quill Lake.

BAIRD'S SANDPIPER. 19 June: 5 along the E shore of Big Quill Lake.

STILT SANDPIPER. 20 June: a flock of 15 at Middle Quill Lake.

SEMIPALMATED SANDPIPER. 20 June: a flock of 20. An additional 75 "peeps" seen on 20-21 June may have included this species.

MARBLED GODWIT. A total of 146+ seen; also 2 broods (each with 1 chick) estimated at 7 days old. The largest group was of 45 with 15 Willets on 20 June.

SANDERLING. A total of 43 seen.

AMERICAN AVOCET. About 200 adults were seen in the area. 19 June: 22 nests with eggs on islands and shoals in Middle Quill Lake; nests contained 1 egg (1 nest), 2 eggs (2), 4 eggs (15), 5 eggs (1), 8 eggs (1), 1 egg + 3 chicks (1), and 3 chicks (1).

NORTHERN PHALAROPE. A total of 105 seen, mostly along the S shore of Big Quill Lake on 20 June.

CALIFORNIA and RING-BILLED GULLS. The four most northeasterly islands in Middle Quill Lake contained a large breeding population of gulls. Among these 4 islands, the NW island was occupied by 450 pairs of Ring-billed and 40 pairs of California Gulls,and the SW island contained 150+ pairs of California Gulls. The two most easterly of the nesting islands were not visited but at least 1,000 gulls were seen there. Most eggs had hatched by 19 June; chicks were up to 2 weeks old.

COMMON TERN. 19 June: a small island contained 30 nests; most eggs had hatched.

OTHER SPECIES: Horned Grebe, Eared Grebe, Canada Goose, Mallard (nests with 7 and 12 eggs), Gadwall (nests with 9, 10, 12 and 12 eggs), Pintail (nest with 15 eggs), Green-winged Teal, Blue-winged Teal, American Wigeon, Northern Shoveler, Redhead, Canvasback, Lesser Scaup (nests with 8, 10, 11 and 13 eggs), Common Goldeneye, Bufflehead, Ruddy Duck, Red-tailed Hawk, Swainson's Hawk, Marsh Hawk, American Kestrel, Sharp-tailed Grouse, American Coot, Franklin's Gull, Black Tern, Rock Dove, Mourning Dove, Common Flicker, Eastern Kingbird, Alder Flycatcher, Least Flycatcher, Horned lark, Tree Swallow, Bank Swallow, Barn Swallow, Purple Martin, Black-billed Magpie, Common Crow, House Wren, Long-billed Marsh Wren, Gray Catbird, Brown Thrasher, American Robin, Mountain Bluebird, Sprague's Pipit, Cedar Waxwing, Loggerhead Shrike, Starling, Warbling Vireo, Yellow Warbler, Common Yellowthroat, House Sparrow, Bobolink, Western Meadowlark, Yellow-headed Blackbird, Red-winged Blackbird, Northern Oriole, Brewer's Blackbird, Brown-headed Cowbird, American Goldfinch, Savannah Sparrow, Baird's Sparrow, Le Conte's Sparrow, Vesper Sparrow, Clay-colored Sparrow, Song Sparrow, Chestnut-collared Longspur.

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THE CATTLE EGRET ARRIVES IN SASKATCHEWAN

DALE G. HJERTAAS, Fisheries & Wildlife Branch, Saskatchewan Dept. of Tourism & Renewable Resources, 2602 - 8th Street East, Saskatoon, Saskatchewan, S7H 0V7.

The Cattle Egret, a native of Africa, Asia and southern Europe, has expanded its range dramatically in the last century to include North and South America and Australia. The species established in South America in the 1930's, or possibly earlier. Crosby[4] has shown that the first North American birds, those photographed in southern Florida in 1952 and found nesting in the same area in 1953, were probably immigrants from the expanding South American population.

From this beginning, the Cattle Egret has greatly increased its numbers and range on this continent. In 1954 they nested for the first time in Northern Florida.[14] By 1962, only 9 years after its first recorded nesting in the U.S.A., it was established intermittently along the coast from Texas to Maryland and along the Great Lakes in Ontario (Fig. 1). By 1970 it had filled the gaps in its coastal range, moved inland and spread north along the Mississippi Valley. It had also reached California, apparently crossing Mexico at the Isthmus of Tehuantepec in the mid-1960's, and moving up the Pacific Coast to establish a colony at the Salton Sea in 1970.[4]

The first Canadian record was in 1952 when one was recorded on the Grand Banks of Newfoundland.[6] Since then, Cattle Egret records have been obtained for most provinces and even the Northwest Territories.[12] The first prairie records were one near Brandon, Manitoba, in 1961 and one near Iron Springs, Alberta, in November, 1964.[15] The first Canadian breeding records were at two localities in southern Ontario in 1962.[3] In subsequent years, small numbers bred along Lake Ontario and Lake Erie, principally at Pigeon Island near Kingston and Pelee Island at Canada's southern tip.

The range and population expansion of this species is continuing. By 1976 the Florida breeding population had increased to 200,000 pairs, making the Cattle Egret that state's most abundant heron only 27 years after it first nested there.[13] Fig. 1 shows how, to 1978, the range has extended farther north and inland in New England, into Northern California, across the southern Great Plains into Arizona, Utah and Idaho, and up the Mississippi Valley into Wisconsin, Minnesota and the Dakotas. North Dakota's first nest records were 15 nests in 1976 and 11 in 1977 at J. Clark Salyer National Wildlife Refuge, 50 km southeast of Saskatchewan.[11]

The Cattle Egret in Saskatchewan

Two Cattle Egrets reported by Hugh H. Hedger at the Nis'ku Goose Project near Eyebrow on 14 to 17 June, 1974, provided the first record in Saskatchewan.[9] On 28 July, 1977, the author obtained the second Saskatchewan record when two egrets were seen sitting on old

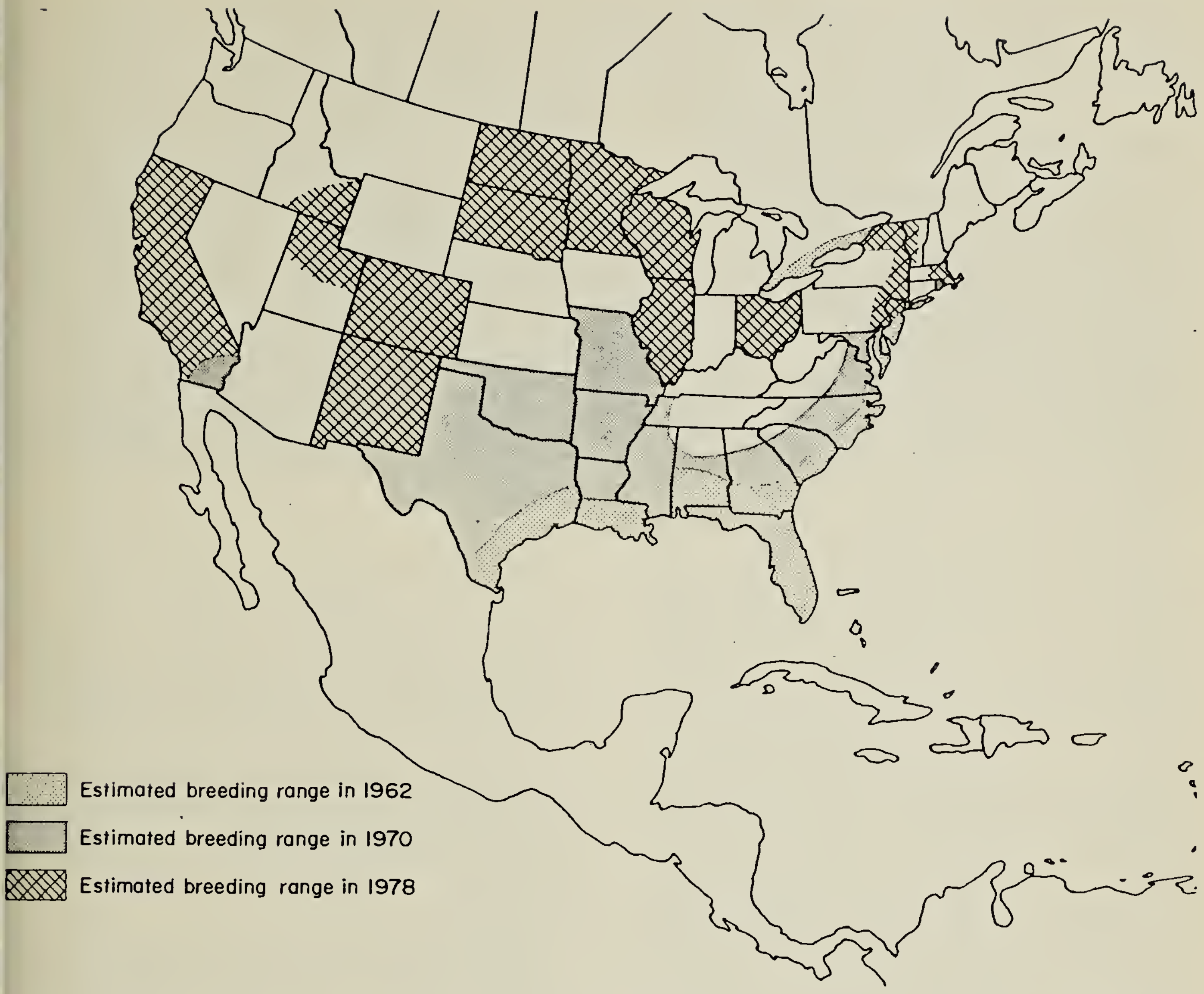
Estimated breeding range in 1962
Estimated breeding range in 1970
Estimated breeding range in 1978

Figure 1: Estimated breeding range of the Cattle Egret in Canada and the United States in 1962, 1970 and 1978. (Based on Nesting Season Reports in American Birds from 1959 to 1978.)

bridge pilings beside Long Creek 1 mile west of Maxim on SE 30-4-15-W2. They flushed to join four others feeding with cattle in pasture on the same quarter section beside Long Creek. I obtained identifiable photographs of these birds to confirm a new species in Saskatchewan.

At least two of the six birds were in breeding plumage. On 4 August, I observed seven in the area of which six were in breeding plumage and on 23 August, 10 Cattle Egrets were present. On each occasion they fed in the same small pasture with the same cattle. They usually walked beside a cow, catching insects disturbed by its movement. When I was too close to the cattle, the egrets would feed on their own but returned to the cattle as soon as I moved away. These egrets were also observed and photographed by other birders, including Fred Lahrman and Wayne C. Harris. I revisited the area in hope of finding a nest on 27 June, 1978, but was unable to locate any egrets.

Fig. 2 shows locations of six records of the Cattle Egret in Saskatchewan. John Toten of the U.S. Fish and Wildlife Service saw up to seven at the Ding Darling Ducks Unlimited Project near Little Quill Lake several times during August 1977.[7]

In 1978, two Cattle Egrets were observed near Richardson from 22 to 29 May, one near Saskatoon on 27 and 28 May,[8] and three in non-breeding plumage at Kinistino on 8 June,[16] providing the fourth, fifth and sixth Saskatchewan records.

Rapid Spread in North America

Several features of the biology of the Cattle Egret have facilitated its population expansion in North America since 1953. These can be divided into behavioural adaptations which allow pioneering to a new area, and adaptations which allow successful establishment and reproduction in the new site.

Post-breeding wandering is common in Cattle Egrets, especially among juveniles, as it is in many herons. This wandering can lead to colonization of new areas and may be the mechanism of dispersal from Africa to South America.[2] Rice[14] suggests migration with other heron species leads Cattle Egrets to new heronries outside its previous range. He believes the Cattle Egret would not nest in colonies of its own kind smaller than ten pairs, but even lone pairs can establish in colonies of other species.

The success of colonization attempts indicates the Cattle Egret is filling a vacant feeding niche. It feeds in grasslands, usually away from water. It prefers to walk near a grazing cow and catch grasshoppers, its most important food item, and other prey flushed by the grazing animal.[10] Although Cattle Egrets also feed by themselves, they are 3.6 times more efficient when feeding with a large animal.[5] Rice[14] believes this increased efficiency is essential for the species' successful reproduction.

Jenni[10] showed that Cattle Egrets raised more young per pair than Louisiana Herons, Little Blue Herons or Snowy Egrets in the same colony because they were able to provide more food and raise all their chicks. The youngest chick usually starves in nests of the other species. Jenni concluded that the Cattle Egrets had tapped a feeding niche where they did not compete with other heron species.

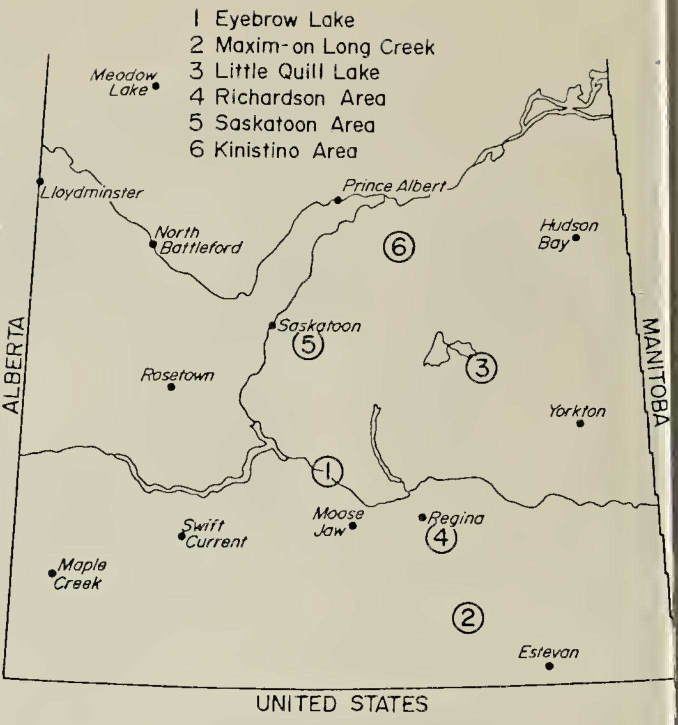

Figure 2: Locations of the first six records of the Cattle Egret in Saskatchewan.

Their need to feed with large animals may also account for the Cattle Egret's failure to colonize the Americas hundreds of years ago.[1] No large grazing mammals were indigenous to the American tropics. Thus, it is only since European settlement and establishment of a cattle industry that Florida, Central America and northern South America provided suitable habitat for Cattle Egrets. When a cattle industry had been established and pasture land provided suitable feeding areas, it was simply a matter of time before Cattle Egrets successfully crossed the Atlantic and colonized America.

Future in Saskatchewan

Successful nestings in North Dakota suggest the Cattle Egret will continue to appear in Saskatchewan and will probably be found nesting within a few years. Observers should watch for this species, particularly where existing heron colonies are

Cattle Egrets at Maxim *Dave Duffus*

close to moist, moderately grazed pastures which provide preferred feeding areas for the egrets.

While herons do show interspecific territoriality and compete for nest sites and materials, the Cattle Egret should not have adverse effects on populations of Great Blue Herons and Black-crowned Night Herons in Saskatchewan because nest sites are not limiting in most colonies, and the Cattle Egret uses a different feeding niche than other herons.

I am grateful to George Duff, J. B. Gollop, C. S. Houston, W. J. Maher, and Verna MacKinnon for assistance n preparing this manuscript.

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SOCIAL VALUES OF DESERTED ISLAND BIRDS

W. J. DOUGLAS STEPHEN, Canadian Wildlife Service, Prairie Migratory Bir
Research Centre, Saskatoon, Saskatchewan, S7N 0X4.

Every once in a while applied scientists are afforded an opportunity to pursue curiosity in their field of endeavour. Such an occasion arose for me last January as I rediscovered an article about a test of opinion among ornithological workers in England.[1] I decided that such a test could be replicated at the Prairie Migratory Bird Research Centre (PMBRC) in Saskatoon, tried it and here are the results.

In late January 1979 questionnaires were handed to each of 12 coworkers with three intended for their wives. A single sheet of paper was used with the question "If you were cast away on a deserted island, which 10 Canadian birds would you most like to take with you and which five would you most like to leave behind?" The sheet had 10 lines under the heading "Take" and five under "Leave". There were also three lines under the heading "Main assumptions you made:" and an identifier number on the sheet. The number was intended to provide an illusion of objectivity to the analyst if not anonymity to the respondent. One respondent obscured the identifier, photocopied the questionnaire, gave copies to each of two married couples known to him, who also responded.

In all, 13 responses were received, four of them anonymous to me. Respondents unanimously agreed to leave House Sparrows behind if cast away on a deserted island (Table 1). Even the three responses not tabulated agreed on that. Some birds were listed as families such as hawks, hummingbirds, etc., and thus not tabulated. Five responses were incomplete or listed domestic species like chickens and one response listed "jailbirds" and "birdbrains".

TABLE 1. Birds preferred on a deserted island by 10 Saskatchewan people.

Species	**Voted Take**	**Voted Leave**
Black-capped Chickadee	6	0
Western Meadowlark	6	0
Canada Goose	5	0
Ruffed Grouse	3	0
Great Horned Owl	3	0
American Robin	3	0
White-throated Sparrow	3	0
Common Loon	2	0
Pileated Woodpecker	2	0
Barn Swallow	2	0
Varied Thrush	2	0
Yellow Warbler	2	0
Northern Oriole	2	0
Vesper Sparrow	2	0
36 species	1	0
Double-crested Cormorant	1	1
Common Raven	1	1
Black-billed Magpie	2	2
Rock Dove	1	3
Gray Partridge	0	1
Brewer's Blackbird	0	1
Common Grackle	0	1
Herring Gull	0	2
Brown-headed Cowbird	0	2
Common Crow	0	5
Common Starling	0	6
House Sparrow	0	10

Swans, Hawks, Gulls, Hummingbirds, Swallows, Bluebirds and Blackbirds as families were given votes by some respondents and are not included.

In total 62 species were listed of a possible 150 if all responses had been complete, if only Canadian bird species had been listed and if each person's list had been entirely diferent. Some species were conspicuous by their absence such as he Sharp-tailed Grouse, Saskatchewan's symbolic bird. The Blue Jay was mentioned only once although all respondents had some knowledge of the Saskatchewan Natural History Society's journal. Fifty species were mentioned only to ake, eight only to leave and four species would be taken by some people and left by others.

The data generally confirm the results obtained in England and allow me to form hypotheses of possible interest to social scientists.[1] Simply stated they might be: (1) only a few bird species are unpopular with many people, i.e., could be abandoned in a new life. (2) many bird species are popular with most people. Those statements could be made mathematically, the first possibly a gentle curve and the second possibly a steep straight line but not of much interest here. Perhaps the most interesting wildlife management problem revealed in a numerical way is the "disputed zone" in which the same species of bird is liked by some people and disliked by others.

In analysis of the responses as hey came in, it became apparent that irm conclusions about people's preferences and possibly useful applications in decisions of what to do, where and why, would be perilous at the very least. That conclusion ead to the decision to tabulate only 0 responses. Analysis of the results of the "Deserted Island Questionnaire" beyond the tabulation and imited conclusions drawn here needs more human understanding

Western Meadowlark *Fred W. Lahrman*

than I have or care to gain. An indication of the greater human understanding needed was the conversion of a "deserted island" question into an article headed "Desert Island Birds". A similar conversion was made in the heading for preliminary tabulation. I suspect some respondents made that mental conversion too. The main conclusion, confirmation of the results of a similar questionnaire in England, and speculation presented here could readily be a launching pad for investigation by others. Would Canadian Prairie farmers feel the same as Robinson Crusoe?

Acknowledgements

I want to thank respondents to the questionnaire who took the exercise cheerfully with good sense. I also want to thank J. B. Gollop who provided a backboard against which to bounce ideas and sometimes returned them from unexpected angles. I also thank Brian Johns who cheerfully undertook tabulation.

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[1] SALES, D. 1973. Desert island birds. British Trust for Ornithology News, 61:5, October 1973.

PROTHONOTARY WARBLER AT REGINA, SASKATCHEWAN

ROBERT KREBA, Saskatchewan Museum of Natural History, Wascana Park
Regina, S4P 3V7.

On 13 September, 1978, I sighted a male Prothonotary Warbler in Wascana Park, Regina. I had taken the afternoon off from working at the Museum of Natural History after noticing quite a few migrant warblers and finches around the Museum building. I made my way south through the park from the Museum, patrolling the trees along Albert Street and then turning east, parallel to the north shore of Wascana Lake.

As I approached the Bandshell area, I encountered a loose flock of warblers busily foraging in the trees which were mostly elms. I noticed an unusually bright bird which I initially thought was a Yellow Warbler, as only its head was visible. It then moved into a full side view and kept fairly quiet for about 2 minutes. The bird then flew from me, about 20 feet into another elm, at which time I clearly observed the white tail patches (reminiscent of Magnolia Warbler). I quote from my notes, September 13, 1978, 1:41 p.m.:

"♂ in full breeding plumage, seen in *Ulmus* ("resting", not foraging), and also in flight, when white tail patches seen well. Orange-yellow head and breast, blue-grey wings, back and tail well observed (no eyeline, no wing bars as in *Vermivora pinus*); no other observers, total observation time about 3 minutes."

I watched it for about another minute, then ran back to the Museum so that Fred Lahrman could confirm the sighting. By the time I located him and we got back outside, 10-15 minutes had elapsed, and although we searched the area for about 20 minutes, we could not relocate it. The Prothonotary was associated with a group of foraging warblers, including Tennessee, Yellow, Myrtle, Magnolia and Redstart; however, it was not observed foraging. Observations were made with 7x50 binoculars, initially at a distance of 10-15 feet.

Very strong easterly winds over the previous two days, originating from an intense low pressure system with its attendant counter-clockwise air circulation, could have blown this bird off course. It was accompanied by a wave of migrants that yielded 15 (or 16) species of parulids on the 13th and 10 on the 14th. At different times Bob Luterbach, Frank Brazier and I looked for the bird later on the 13th and again on the 14th without success.

Conditions for viewing on September 13 were good, with heavy overcast, diffused light and no shadows. There was no precipitation when I first saw the bird, but intermittent mist, rain, and drizzle did interfere when Fred Lahrman and I were searching for it.

I have no previous field experience with this species, but am familiar with all the expected species for our area, and have little difficulty with "confusing fall warblers". This is a distinctive bird and I am confident of my identification. Differences from the somewhat similar Blue-winged Warbler were seen, as noted above. In addition, it seemed rather bigheaded as compared to a *Dendroica* warbler, like the Yellow Warbler, and had a proportionately heavier bill.

I should note that September 13 is a very late date for this species, particularly at such a northerly latitude. These birds begin their migration southward in July, and are virtually absent from most of their breeding range by mid-August.[3] Prothonotary Warblers breed from Minnesota to Texas and eastward.[1]

There is only one previous record of this species for Regina and Saskatchewan, a male seen on 17 May, 1969, in the same area of the park, by D. G. Bobbit and Father H. B. Bedard.[2]

[1] BENT, A. C. 1953. Life histories of North American wood warblers. U.S. Nat. Mus. Bull. 203.

[2] BOBBIT, D. G. 1969. Sighting of a Prothonotary Warbler in Regina. Blue Jay 27(3):149.

[3] WALKINSHAW, L. H. 1957. Prothonotary Warbler. Pages 46-49 *in* The warblers of North America. Devin-Adair, New York.

CASPIAN TERN NESTS AT LAST MOUNTAIN LAKE, SASKATCHEWAN

J. R. CALDWELL and C. JORGENSON, Canadian Wildlife Service, Saskatoon, Saskatchewan.

On 21 July, 1978, we inspected Perry's Point (on the east shore of Last Mountain Lake, 10 miles west of Govan) and a small, sand and rock island just off its southern tip. Our objective was to find out whether pelicans and/or cormorants were nesting there since both species are seen on the lake each summer and have nested on Perry's Point in the past. We found no evidence that these species were breeding at either location but did see eggs and young of Common Terns and two Piping Plover chicks on the small island. A large gull colony occupied the tip of Perry's Point.

While on the little island our attention was attracted by two large terns that kept diving at us. These birds had large, red bills, which is a distinguishing characteristic of the Caspian Tern according to Peterson's Field Guide to Western Birds. By their aggressive behaviour we felt certain that they were nesting. On 24 July, Brian Johns and Bob Godwin (Canadian Wildlife Service, Saskatoon) were able to verify that Caspian Terns were breeding at Last Mountain Lake when they observed the adults offering food to a chick on the small island adjacent to Perry's Point. This breeding record brings to two (the other is Doré Lake) the number of places in Saskatchewan where Caspian Terns have been found nesting.[1] It extends the list of birds recorded at the north end of Last Mountain Lake to 218 and the number of breeding species to 91.

We thank Dr. J. B. Gollop (Canadian Wildlife Service, Saskatoon) for his interest in our sighting of Caspian Terns at Last Mountain Lake that led to verifying the nesting record.

[1] HOUSTON, STUART. 1956. The Caspian Tern in Saskatchewan — with first breeding record. Blue Jay 14:116-117.

ADULT ALBINO YELLOW-HEADED BLACKBIRD IN MANITOBA

D. F. BRUNTON, Box 757, Canmore Alberta T0L 0M0, and H. L. DICKSON, 2037 Honeywell Avenue, Ottawa Ontario

Early on 19 September, 1978, we observed an albino Yellow-headed Blackbird along the Trans-Canada Highway near Virden, Manitoba (10.5 km east of Highway 26). It was in a flock of approximately 20,000 birds which we estimated to consist of 45% Yellow-headed Blackbirds and 55% Red-winged Blackbirds.

The bird was entirely white, with only a very pale yellow wash on the head, neck and upper breast, where the bright yellow of a normally-coloured Yellow-head is distributed. Although poor lighting did not permit us to determine eye colour, the eyes did not contrast sharply with the facial colour, suggesting that they were lighter than the typical dark brown of a normal blackbird.

We observed the bird for about 10 minutes and throughout this time it appeared to behave in the same manner as the other Yellow-headed Blackbirds in the flock which were foraging in a cut-over grain field. They displayed no particular interest in the albino, but Red-winged Blackbirds were observed diving at it each time if flew.

We are under the impression that pure (or nearly pure) albino blackbirds are not at all common. The fact that this was an adult male, which only assumes its yellow head colouring in the second year, is of additional interest. One would expect that an albino blackbird, having the additional difficulty of an abnormal and conspicuous appearance, would not survive long in the wild. For one to reach full maturity may indeed be very rare.

THE HINTON ALBERTA, BLUEBIRD TRAIL, 1976-1978

TED W. CARTER, Box 62, Group 29, R.R. No. 1B, Winnipeg, Manitoba, R3C 2E4.

The Hinton Bluebird Trail was initiated in 1976 with 100 nest boxes. The results for that year were published in the March 1977 *Blue Jay* under the title "Bluebirds and Clearcuts" by G. A. Wilde. In 1977, 40 additional boxes were placed bringing the total to 140.

The nesting boxes were monitored during May, June and October, 1977, by G. A. Wilde, and May and July of 1978 by G. A. Wilde and E.W. Carter. All results were tabulated and are summarized in this report.

Of the 140 nesting boxes, 108 are located on or adjacent to clearcut areas and 32 boxes are along streams, in heavily forested areas or on steep slopes. Our results indicate clearcuts and other sites almost equally favoured with the 1977 figures showing occupancy of 22% of boxes on clearcuts as compared to 26% on the other sites. The 1978 figures support those of 1977 with 33% of boxes on clearcuts occupied versus 38% on other sites. Total occupancy has increased from 20 boxes in 1976 to 52 boxes in 1978 (See Table 1).

TABLE 1. Occupancy of Nesting Boxes

Species	**Year**	**Boxes Used**			
		Clearcut		**Others**	
		Number	**Percent**	**Number**	**Percent**
	1976	7	3.1	2	0.05
Bluebird	1977	17	15.7	5	15.6
	1978	24	22.2	7	21.9
	1976	2	2.0	—	—
Tree Swallow	1977	4	3.7	3	9.4
	1978	14	12.0	5	12.5
	1976	9	9.2	—	—
Unidentified	1977	3	2.8	2	6.2
	1978	1	0.9	1	3.1
Destroyed by Man	1976	—	—	—	—
	1977	2	2.8	1	3.1
	1978	7	6.0	4	10.0
Destroyed by Red Squirrel Gnawing	1976	4	4.1	7	0.2
	1977	3	2.8	1	3.1
	1978	2	1.9	3	9.4

Problems include vandalism which is evident only on the most open sites. In 1978 10 boxes were partly or totally destroyed, the most since the program began. Competition for the boxes from Red Squirrels *(Tamiasciurus hudsonicus)* occurred only on forested sites. This problem involved the use of three houses in 1978 for nests or food caches.

One other problem in 1978 was dead females or dead young found in six boxes. It is probable that the mortality was a result of attacks on the older birds by raptors such as the Merlin or the American Kestrel. These birds must find easy access to the open site boxes as all boxes containing dead birds were located on clearcuts. Furthermore four of the six boxes affected were located within a 1.5-mile radius. This may indicate that the nesting boxes are within the home range of a predacious bird. A pair of Kestrels was seen in the immediate vicinity during the July, 1978, survey. Local logging truck drivers indicate that raptors are quite numerous along the Bluebird trail.

Success of the program is dependent on future generations of bluebirds and Tree Swallows returning to the area and discovering previously unused nesting boxes. Judging from the favourable results over the past 3 years, the number of birds occupying the nesting boxes will continue to increase.

Success of the program can be questioned if no new broods are leaving the nests. If the occurrence of dead birds should persist in the same area for another season it would be advisable to relocate the affected boxes.

Mountain Bluebird male *G. W. Beyersbergen*

PRINCE ALBERT, SASKATCHEWAN BIRD HOUSE TRAIL

KEVIN ASCHIM and KIM HRUSKA,
1175 - 22nd St. East, Prince Albert,
Saskatchewan, S6V 1P2.

Last winter (1977-78) we built 54 nest boxes and set them up between Rosthern and Prince Albert. We also restored an old birdhouse line between Prince Albert and Spruce Home. Our results have been satisfactory, though the boxes on the line to Rosthern were placed too late to attract any bluebirds.

We have completed another 48 nest boxes and hope to set them up north of Prince Albert early in 1979. It is difficult to service houses farther south than Rosthern, half way to Saskatoon, and we wonder if anyone in the Saskatoon area would be willing to connect our trail at Rosthern with the main trail at Saskatoon?

	Prince Albert -Spruce Home	**Prince Albert - Rosthern**
Number of boxes	54	27
Boxes occupied	54	21
% occupancy	100%	77%
Boxes uninhabitable	0	3
Boxes not used	0	3
Tree Swallow pairs	54	12
live young	302	70
dead young	8	0
av. young/house	5.74	5.83
House Sparrow pairs	0	7
live young	0	22
dead young	0	2
Red Squirrel pairs	0	2

EASTERN WOOD PEWEES' LONG NESTLING PERIOD

JEAN BANCROFT, 264 Campbell Street, Winnipeg, Manitoba, R3N 1B5.

During the summer of 1978 I had the privilege of observing an Eastern Wood Pewee build two nests in the garden of our summer cottage at Whytewold about 5 km, south of Winnipeg Beach on the south shore of Lake Winnipeg. For the past 5 summers this species has nested in the neighbourhood of our cottage.

However, 1978 was different in that, firstly, she built two nests, the first one having been pilfered by a crow when the clutch was just a few days old. On 23 July she commenced to pull and peck small bits off the first nest and fly to the new location. She chose a horizontal lichen-covered limb of an oak tree, approximately 6 metres from the gound. Secondly, this nest was not vacated by the young until 31 August, making it a long nestling period. This is what made it so interesting and unusual.

During the time she was rebuilding there were several crows and red squirrels in the immediate area on many occasions. So I was delighted to observe on 29 July that she was finally sitting once more.

On 10 August I observed the female perform her usual acrobatic flight for midges, sit on a bare branch of the same tree, and then fly back, perch on the rim of the nest, and put her beak down into it three times. It wasn't until the 14th that I was able to confirm there were three little beaks. By the 29th the little nest was more than top heavy with three overly active young, the fine grasses around the top of the nest began to loosen and some pieces were hanging down.

I was not able to observe the nest for one and one-half days until 11:30 a.m. 31 August. By that time I noticed the young had left the nest, in all probability that morning, as the three of them were sitting huddled together in a row on a bare branch of a tall poplar, 15 metres away from the nesting site, all demanding food, with squeaks like a mouse in distress.

From my daily observations I have concluded that the young were 20 days old when they left the nest. It may be that the reason for the longer nestling period was due to the lateness of the season, with a resultant scarcity of food. During the third week the female appeared to have become very weary as, instead of making numerous relays with food for such a hungry brood, she had to take long rests in between and remained quite still on a dead branch of the oak. Also, her call became rather sad and much quieter, as though her energy had become depleted.

At no time did I see the male bringing any food to the nest; he was content to give his sweet plaintive call from daylight to dusk — "pee-a-wee" (pause) "peea", from 12 to 16 metres away in the wooded area nearby, but he was always the protector when crows, grackles and red squirrels were in the vicinity of the nest.

I understand that the normal nesting period for young pewees is from 12 to 14 days. Upon referring to A. C. Bent I found mention of three instances of longer duration — 15, 16 and 18 days. It may just be that this particular nest set a record for an Eastern Wood Pewee.

PIPING PLOVERS USE MAN-MADE HABITAT

FRANK A. SWITZER, 1301 Shannon Road, Regina, Saskatchewan, S4S 5K9.

In 1978 the Saskatchewan Department of Highways used Boundary Dam Power Station lagoon ash as a highway building sub-base on 25.9 km of No. 47 Highway north of Estevan. It was my job for the Saskatchewan Power Corporation to photo-document the excavation of ash from a lagoon immediately west of the Power Station.

The first series of pictures was taken in early June. While walking around the lagoon photographing the dewatering process I heard a strange bird call. There were several species of wading birds on an adjacent lagoon and I scanned them with binoculars but could not find the source of the call.

The second series of pictures were taken in early July when start of ash hauling was just under way. Again while walking around the lagoon I heard the strange bird call. Again I swept the adjacent lagoon with binoculars but could only see one small shorebird on an island-like deposit of ash. Because of the quicksand characteristics of bottom ash when lagoons are being filled I could not get close enough for a good look.

Upon returning home I listened to shorebird calls on Peterson's records. The call I heard at Estevan closely resembled the one for Piping Plover. I could hardly wait for the next trip to Estevan.

The last pictures of the excavated lagoon were taken in late August. Again I visited the adjacent active lagoon and finally saw and photographed the source of my strange bird call. There were four Piping Plovers, two juveniles, a female and a male. I was only able to get pictures of the male bird against the slate grey bottom ash background. However, that was enough to determine that the bird, both from direct observation, and later from studying the picture, to be an adult male Piping Plover.

Other sightings of this bird in Saskatchewan have been made on Bigstick Lake, Old Wives Lake, Last Mountain Lake, Quill Lake, and near Indian Head. All these locations are farther north than Estevan and sightings were in non-modified habitat. The Estevan sighting is unique in that the Piping Plovers were using an industrial disposal site — an ash lagoon. They presumably nested on or near the lagoon and were using it as foraging territory. When I took the picture in August, all the birds were busy feeding along the ash shore line of the periferal lagoon water body.

Other shorebirds seen on the Boundary Dam ash lagoons were:
Killdeer — most often seen.
Upland Sandpiper — one observed on lagoon dike in June.
Spotted Sandpiper — observed throughout the summer.
Willet — observed throughout the summer.
Greater Yellowlegs — observed one in late August.
Lesser Yellowlegs — largest numbers in spring and fall migration period.
Baird's Sandpiper — observed only three during early spring migration.
Avocet — observed periodically throughout the summer.
Wilson's Phalarope — observed only in May.

MOVEMENT OF BANDED BATS IN ALBERTA*

HUGH C. SMITH, Provincial Museum of Alberta, Edmonton.

Movements of big brown bats *Eptesicus fuscus* and little brown bats *Myotis lucifugus* in western Canada are poorly known. As a result of a recent banding program, the movements of three individuals of these species deserves some mention.

A juvenile female big brown bat banded on 21 July 1977 at a nursery colony near Stony Plain, Alberta, was recovered on 26 November 1977 near Caroline, Alberta. The straight line distance between these two locations is approximately 176 km (104 mi.). This return is the first recapture in Alberta of a big brown bat away from the place of banding.

Big brown bats are considered sedentary species and long distance movements are uncommon.[1] Table 1 lists the distances moved by big brown bats that have been reported by various authors. It indicates that immatures of both sexes are involved in long distance movements.

One purpose of the banding program that was initiated in 1972 was to attempt to discover where our plains region bats were going in the winter and where the hibernating bats were spending the summer. Little brown bats are distributed throughout the plains region of Alberta during the summer. Their known winter distribution in the province is at three hibernacula — two in the mountains in southwestern Alberta and one in Wood Buffalo National Park in northern Alberta. None of these hibernacula contain a population of bats large enough to account for the summer population of even a medium sized nursery colony. Unfortunately we have yet to document movements of bats between the mountains and plains regions. However, one bat has shown at least a tendency to move from the plains regions toward the mountains.

An adult male little brown bat banded on 8 September 1977 in Edmonton, Alberta was recovered on 13 September 1977 near Rocky Mountain House, Alberta; a movement in a southwest direction of approximately 150 km (90 mi.) in five days. Rocky

Banded little brown bats, Cadomin Cave, Alberta *Lawrence Harder*

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*Natural History Contribution No. 52.

TABLE 1. Movement of big brown bats.

Author	*Sex*	*Age*	*Distance*
Beer, 1955[2]	M	—	98 km (61 mi.)
Mumford, 1958[8]	M	—	227 km (142 mi.)
Brenner, 1968[3]	M	immature	32 km (20 mi.)
Davis, et. al., 1969[4]	F	Adult	55 km (32 mi.)
Goehring, 1972[5]	—	—	88 km (55 mi.)
Mills, et. al., 1975[7]	F	immature	280 km (180 mi.)
Mills, et. al., 1975[7]	M	immature	248 km (155 mi.)
this study	F	immature	176 km (104 mi.)

Mountain House is within 80 km (50 mi.) of the mountains.

A second little brown bat recovered west of its banding site was an adult female banded at a nursery colony near Bonnyville (east central Alberta) on 11 July 1972. This bat was recaptured at the same nursery colony on 4 June 1973. On 9 June 1974 it was killed at Onoway, Alberta, approximately 225 km (136 mi.) southwest of the banding site.

Although the distance travelled by either of these little brown bats is not remarkable both represent movement towards the mountains.[6] However, the date and lack of data on the circumstances of capture of the second bat limit the interpretation of this record.

The number of bats that have been banded in the province is relatively small, but several have come to the attention of members of the general public. The three movements described here all were as a result of a member of the general public taking the trouble to advise appropriate authorities of their finds. Without the co-operation of the public such programs as bat banding would be sorely limited with respect to obtaining results of bat movements away from areas of initial banding.

I would like to thank David Schowalter, of the Alberta Fish and Wildlife Division for his comments on this note and for the effort he has put forth in banding bats in Alberta.

[1] BARBOUR R. W. and W. H. DAVIS. 1969. Bats of America. Univ. Press of Kentucky, Lexington, Kentucky. 286 pp.

[2] BEER, J. R. 1955. Survival and movement of banded big brown bats. J. of Mammalogy 36:242-248.

[3] BRENNER, R. J. 1968. A three year study of two breeding colonies of the big brown bat, *Eptesicus fuscus*. J. Mammalogy 49:775-778.

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[5] GOEHRING, H. H. 1972. Twenty-year study of *Eptesicus fuscus* in Minnesota. J. Mammalogy 53:201-207.

[6] HUMPHREY, S. R. and J. B. COPE. 1976. Population ecology of the little brown bat, *Myotis lucifugus,* in Indiana and north-central Kentucky. Special Publ. No. 4 American Society of Mammalogists. 81 pp..

[7] MILLS, R. S., G. W. BARRETT, and M. P. FARRELL. 1975. Population dynamics of the big brown bat (*Eptesicus fuscus*) in southwestern Ohio. J. Mammalogy 56:591-604.

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NOTES ON SOME MAMMALS OF THE COOKING LAKE HIGHLANDS, ALBERTA

E. OTTO HÖHN, Department of Physiology, University of Alberta, Edmonton, Alberta, T6G 2H7.

The Cooking Lake Highlands form a slightly elevated area, overlying a moraine of the same name, which lies to the east of Edmonton, extending to within a few miles of Tofield (see map). While in most of the Edmonton district the original aspen forest has been destroyed, an almost unbroken belt of poplar woods with a slight admixture of birch and spruce still extends over these highlands, from Elk Island National Park in the north to the Miquelon Lakes in the south and for a somewhat shorter distance east to west. The small acreage where I trapped small mammals to determine the species occurring locally lies within this area, and as I have owned it for twenty years, the observations reported below were made over that period. I have, however, also included reports of sightings of the larger and unmistakeable mammals by the district game warden at Ministik, Mr. Keith Williams, and other residents in the district, for these provide evidence of the occurrence of species one would not expect in so well settled an area near a large city. The fauna of this district will undoubtedly change as more of it gets broken up into acreages. Indeed, the very marked decrease of mule deer, formerly the dominant species of deer in this area, which has already taken place, is most probably due to increased human disturbance associated with this process.

Species are designated by the English names used by Banfield in his *Mammals of Canada.*[1]

SHREWS: "Trapping", in cylindrical containers buried in the soil with the opening flush with the ground surface (small mammal traps, even when baited with bacon or dead mice, were not effective for shrews) on my acreage near Hastings Lake over four summers, gave the following results: MASKED SHREW: Evidently the most common species; apart from trapped specimens, occasional dead animals found. An intact corpse was found with the fleshless remains of one of these shrews plus those of a red-backed vole in a plastic tube containing oats which the animals had been unable to leave. Evidently one or both shrews had killed and eaten the vole and later one shrew had killed and eaten the other. ARCTIC SHREW: Six collected between 1972 and 1976 and one found dead the following year. Soper describes it as occurring in the transition zone in boreal "islands" but my animals were in ordinary poplar grove country, not in a boreal island.[4] This species is therefore apparently more generally distributed in the aspen parkland zone than his statement indicates. PIGMY SHREW: One of these very locally distributed shrews was collected in 1973.

LITTLE BROWN BAT: This is the only species of bat I observed (and

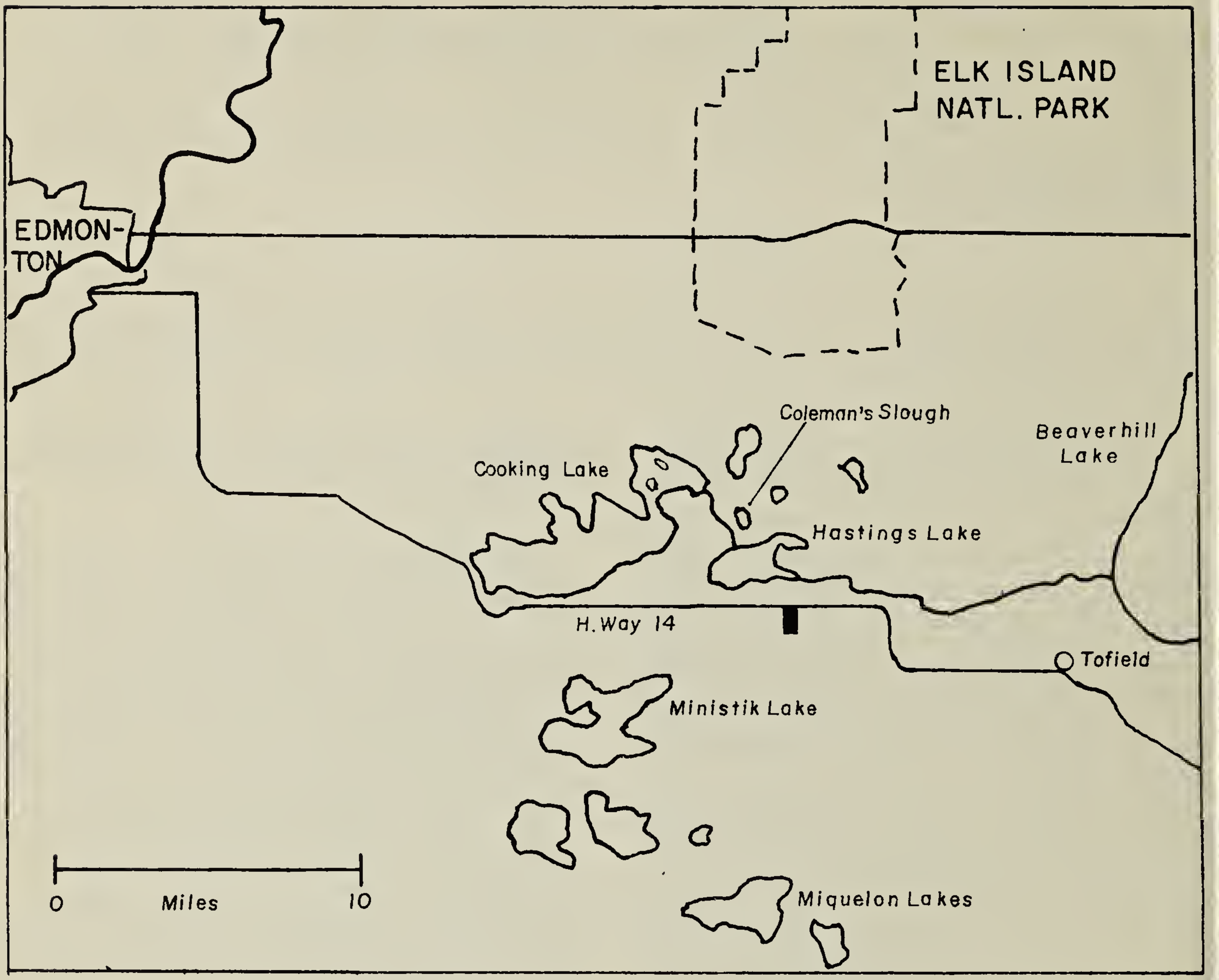

Figure 1: Sketch map of the Cooking Lake Highlands area acreage where small mammals were trapped shown in black.

collected) in the area; some roosted under rubberized shingles of our cottage near Hastings Lake.

SNOWSHOE HARE: Relatively scarce in the district compared to areas 100 miles further north; never more than one or at most two on our twenty acre acreage and sometimes none for several months.

WOODCHUCK: Scarce in this district; only one seen alive near Hastings Lake and the corpse of a melanistic one found.

FRANKLIN GROUND SQUIRREL: In my experience, scarce in the district. I have only seen two or three in twenty years of observation.

FLYING SQUIRREL: When knocking down a disused magpie nest in May 1975, I flushed one from the lower part of the nest. It was not seen subsequently. Mr. F. Rourke of Hastings Lake sees flying squirrels on winter nights at his bird feeder fairly often and has seen a Great Horned Owl attempting to catch one (subsequent squeals later, when the animals were out of sight, suggested the owl had been successful).

MICE AND VOLES: Trapping on my acreage indicated that DEER MICE were by far the most abundant small rodent. These mice and once a HOUSE MOUSE were the only species which entered the cottage. GAPPER'S RED-BACKED VOLE was second in abundance. MEADOW VOLES were the least common of this group and seemed to prefer

ynx *E. Otto Hohn*

oist grassy areas. MEADOW UMPING MOUSE: one was trapped n the acreage in the spring of 1973. hough Soper includes this area in s distribution map of the species, anfield's map shows only the ESTERN JUMPING MOUSE for this area.[41]

GRAY WOLF: The Ministik area game warden told me that the dogs of men hunting coyotes found a group consisting of two coyotes and a wolf on the Ministik Lake bird sanctuary in 1954. The hounds killed the coyotes but the wolf defended itself successfully and escaped. As wolves occur regularly about 120 miles north and west of the district, the local presence of a very occasional wanderer seems plausible.

RED FOX: Dekker has reported that foxes are now more frequently to be seen in the Edmonton region than formerly.[2] However, they live mainly in the more open areas east of the district considered here. I have only seen one about Hastings Lake in 1977 and the Ministik game warden told me he had not seen any nor heard of any sightings.

BLACK BEAR: A member of the R.C.M.P. told me of seeing one at the garbage by his house one night in late 1973 or 1974. These bears occur regularly about 120 miles from the district.

WEASELS: The LONG-TAILED WEASEL is evidently the most abundant of these weasels; with the two exceptions below, all weasels I have seen well enough to identify were of this species. I have never seen the SHORT-TAILED WEASEL in this district in life but trapped two (winter 1972 and 1977) on my acreage. I have only two observations of LEAST WEASELS; both in winter, in each case the animal was crossing a road in front of my car.

MINK: Soper does not include the area considered in his provinical distribution map of the mink, and though Banfield considers all of Alberta to be within its range, it is evidently scarce in this general area.[4] [1] It is, however, fairly frequently trapped in the Cooking Lake Highlands according to the Ministik game warden, and Mr. F. Rourke, who lives on the shore of Hastings Lake, sees mink on the lakeshore or swimming in the lake with some frequency. I saw one on a roa beside my acreage in Septembe 1972; the next day it was shot by neighbor who said it had killed som of his chickens.

LYNX: Since the district lies outside the area of distribution of thi species as mapped by Soper an Banfield it is worth recording that according to the Ministik game warde there is a moderate permane population.[4] [1] In years of "rabbit" crashes in areas further north, wher the lynx is always more numerous, a in 1962 and 1972, greater number were seen in the Cooking Lak highlands. Thus my wife and son sa one on our acreage in July 1962 and saw tracks of one in November 197 I also saw the skin of one shot locall about this time and certain neighbours reported seeing one of thes animals in the winter of 1972/73.

COUGAR: About 1975 there wa evidently at least one cougar an possibly more than one in th district. The owner of the Albert Game Farm received a number phone calls from farmers in the are from Fort Saskatchewan to Camros reporting sightings of cougars. Th callers wanted him to attempt to capture the animal as they feared attack on their cattle. A farmer's daughter Cooking Lake gave me a convincin description of one she had seen i the open in summer, and sever other summer sightings were repo ted to the Ministik game warde There have been no escapes cougars from the Alberta Gam Farm. The district lies 200 miles ea of the nearest area where couga are considered to occur regularly.

MULE and WHITE-TAILED DEE A marked change in the relativ abundance of these two species deer has taken place in this distric Up to about mid-century, the mu deer was the most common deer i his area. Soper does not list the vhite-tailed deer in his account of he mammals of Elk Island National Park and considered it a recent arrival in the district around the park.[4] It now outnumbers the mule deer in the park in the ratio of 9:1 according to the park warden, who believes that the original animals of he species entered the park by crawling under the fences. Keith also efers to the former prevalence of mule deer about New Sarepta, which ies a little south of the district under consideration.[3] Up to the late 1950's, my impression was that these two species of deer occurred in the Cooking Lake highlands in roughly qual numbers, but in recent years nd at present I see only white-tailed eer, which are common. Neverheless, the mule deer is, at least acording to the Ministik game warden, till to be found locally, perhaps only n areas which have not yet been roken up into acreages. My only ecent sightings of single mule deer t Beaverhill Lake in 1976 and 1977 vere somewhat east of the area uner consideration.

ELK and MOOSE: Earlier I had onsidered that the elk and moose in his district reported to me from time time were probably escapes from lk Island National Park. I now conder this improbable because I have een informed that no bison has ever scaped from the park, which ggests that its fences would also revent elk and moose from leaving The representatives of these two pecies still found in the district are, erefore, most probably the remnant a presettlement, native population. heir continued presence is partly ue to the fact that they are not legal ame in this area. Some moose are, owever, occasionally poached and, nimals of both species are ometimes taken legally on Crown land in this area by Indians. The local elk and moose are therefore not fully immune from hunting. While I have not seen any elk myself, the Ministik warden has seen a herd of 40 in the Black Foot forest reserve, an area almost as large as Elk Island National Park which lies between the southern portion of the park and the northeastern part of Cooking Lake and the north shore of Hastings Lake, and he knows of smaller numbers near his home. I have also been told of occasional local sightings by others.

Though rarely seen (my son and I have each seen only one in the Hastings Lake area), the finding of a cast-off antler, tracks and the reported sightings of country neighbours indicate a moderate local population. An individual who often flies a small plane over the district concludes on the basis of his observations that moose are actually fairly common in the area.

Acknowledgements

I am obliged to Mr. N. Panter, sometime curator of the Museum of the Department of Zoology of the University of Alberta, for tips on how to catch shrews, the loan of traps and help with small mammal identifications.

[1] BANFIELD, A. W. F., 1974. The Mammals of Canada. Univ. of Toronto Press.

[2] DEKKER, D., 1973. Red Foxes Make a Comeback in Central Alberta After Thirty Years. Blue Jay 31:43-44.

[3] KEITH, L. B., 1965. Early Notes on Wildlife from New Sarepta, Alberta. Can. Field Naturalist. 79:29-34.

[4] SOPER, J. D., 1951. The Mammals of Elk Island National Park, Alberta, Canada. Canada Dept. of Resources and Development, National Parks Branch, Canadian Wildlife Service, Ottawa, Wildlife Management Bulletin, Ser. 1. No. 3.

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NATURE LIBRARY

RAVENS, CROWS, MAGPIES, AND JAYS

ONY ANGELL, 1978. University of
ashington Press, Seattle and Lon-
on. 112 pp. Cloth, $14.95 U.S.

This large format (8¾" x 11¼")
ook concerns itself with the birds of
e family Corvidae found in North
merica north of Mexico. The three
rairie Provinces have 7 species of
orvids (plus the hypothetical Pinon
ay) found in a wide variety of
abitats, from mountain heights to
e prairies and the coniferous
rests of the north. They are the
ost familiar of birds, yet few take
e time to admire and study them.
deed, the magpie and crow are
id to be the bane of the farmer's
istence, and are persecuted, hunt-
and poisoned. Decried as
ricultural pests and nest robbers,
ey are at the same time the most in-
lligent of birds and worthy in many
spects of our admiration.

The book is divided into two main
ctions, the first a "cast of charac-
s" introducing and describing 17
rth American species, plus the
tive crow, or Alala, of the Hawaiian
ands. It is perhaps here that the
ok is weakest. Each species ac-
unt comprises two pages, a full
ge illustration by the author-artist
cing a page of text. It is the text
t I would criticize. More space
uld have been devoted to details of
scription, range and migration,
bitat, food, and nesting. To be
e, these subjects are all touched
, but in many cases there is only
f a page of text, and in some accounts half or more of this is devoted to personal or historical anecdotes of questionable value. Admittedly this is in keeping with the over-all feel of the book, but the second section provides a more suitable place for this type of narrative. More basic information in the first section would have made the book more useful.

An example is the page on the Common Crow. Little is really said, and here I found one of the very few obvious errors. The author states that there are three races or subspecies, while both Bent and the A.O.U. *Checklist* list four. In his only departure from A.O.U. *Checklist* nomenclature, he lumps the Northwestern Crow with the Common Crow, and half of the account is devoted to this "race." Though the Northwestern Crow may ultimately be relegated to subspecific status, it has not yet been, and I would have liked to see each given a full page with meatier information.

It is in the second section that the book really shines, and becomes more than just a picture-book. Under six chapter headings, the author discusses the mythology, behaviour, ecology and adaptations of these birds in a style that is immensely readable and informative. The reader who has not studied this group will be surprised at the wealth of fascinating data, all supported by references to original sources. His curiosity piqued by a multitude of fascinating tid-bits he may pursue his interests further by consulting the bibliography of 184 titles.

The author lives in the state of Washington, and has studied corvids

Scrub Jay, Illustration from the book

in many areas across the continent. His own experiences, especially in the Pacific Northwest, give this book a personal touch which, like the illustrations, illuminates the intelligence and personable nature of these birds. One is at once informed and entertained, and the book is hard to put down.

It is the art work that will first catch the reader's eye. At least every second page has an illustration, and many of them spill over on to the page facing. These black-and-white drawings portray their subjects in all the diversity of their activities and behaviour. What Angell has achieved here is a distillation of the essence of corvid life, and a joyous portrayal of the business of being a bird. Details are not always anatomically correct, and at times the perspective is startling (as in the "Raven chasing Goshawk") but these faults are easily overlooked in the artist's tota achievement.

The researcher looking for a mine of solid information on the North American Corvidae will have to look elsewhere, as in Derek Goodwin's *Crows of the World* (New York 1976). For the birder and naturalis curious about crows and their kin this is a superb introduction to the family, one certain to make the observer more observant when he o she next encounters a member o this diverse family. The first crow o spring will no longer be the only one to hold your interest after you reac this book. Highly recommended. — Reviewed by *Bob Kreba*, Saskatchewan Museum of Natural History Regina, Saskatchewan.

WILD COFFEE AND TEA SUBSTITUTES OF CANADA

ADAM SZCZAWINSKI and NANC TURNER. 1978. National Museums Canada, Ottawa, Ontario. 111 p $6.95.

This book is a good field guide native plants that can be steeped brewed for beverages. Each of species is described under th following headings — how recognize, where to find, warnings necessary cautions, and how to us (sometimes with recipes). The bo also tells how these plants were us in the past for beverage ar medicinal purposes.

The introduction sketches th history of coffee and tea as well as the various substitutes. It tells how to gather and prepare these plants, and urges caution in identifying them.

Even for a person like myself who has smelled, tasted, nibbled and munched through many of these native gastronomical delights, this publication has some new information. I would recommend it to any beginner outdoor gourmet who already has a good knowledge of plants. Those unfamiliar with plants will need a knowledgeable friend to get the most out of this book.

Two last words: "Good sipping." — Reviewed by *Frank Switzer*, 1301 Shannon Road, Regina, Saskatchewan, S4S 5K9.

THE COMPLETE OUTFITTING AND SOURCE BOOK FOR BIRD WATCHING

MICHAEL SCOFIELD, 1978. The Great Outdoors Trading Company, Marshall, Calif. 192 pp. $6.95.

This book answers a multitude of uestions for the novice birdwatcher, eginning with the basic one posed the introduction: "Why bother with irds?"

A chapter on the history of bird atching takes us back to the first epresentation of a bird, probably the ommon or European Crane, cratched on the wall of a cave in the yrenees in Paleolithic times, and tertains us with anecdotes about mous birdwatchers from istophanes to Roger Tory Peter- n.

There are useful and detailed apters on buying equipment. To te one example, the "Binocular Buying Guide" has pictures and descriptions of 43 types of binoculars. One section deals with publications (periodicals and books) and another with clubs and organizations, how they originated and how to decide which to join. Clubs are listed for each state in the U.S.A. and for all Canadian provinces except New Brunswick and P.E.I., and for 23 countries outside North America, from Australia to Zambia. Next, the best birding sites are identified, beginning with the window looking into one's yard, and going on to list refuges, sanctuaries, etc. There is a state by state list of best birding sites, but no list for Canada. In addition, there is a section on tours, with advice on how to choose a suitable tour.

There is a glossary at the end of the book, and six appendices listing zoos and natural history museums, specifications for bird houses, birds' favourite plants, official state birds, "Rare Bird" telephone numbers, equipment manufacturers, and the 718 North American species.

As this is a soft-covered book, it is less expensive, and its black-and-white photographs of birds and birdwatchers and its chatty text make it more attractive to the novice bird watcher. — Reviewed by *Lois Clark,* 403 - 1233 Fairfield Road, Victoria, B.C. V8V 3B4.

BOOK LIST AVAILABLE

The Blue Jay Bookshop has published an extensive, 37 page list of natural history books and records. Copies are available from Box 1121, Regina, S4P 3B4 for $1.00. With the list you receive a credit note for that amount good for purchases over $6.00.

LETTERS

PRAIRIE NEST RECORD REPORT

The Prairie Nest Record Scheme 1978 season report is now available. For this season, an increase in contributors is needed to fill out information cards on nesting birds thereby giving broader coverage in Alberta, Saskatchewan, Manitoba and the Northwest Territories. For information and blank nest record cards write — H. W. R. Copland, Prairie Nest Records Scheme, Manitoba Museum of Man and Nature, 190 Rupert Avenue, Winnipeg, Manitoba, R3B 0N2.

SCISSOR-TAILED FLYCATCHER AT TUGASKE, SASKATCHEWAN

On 6 June, 1978, Frank Perlett of Tugaske had an excellent view of a strange bird in his field 4 miles north and 1 mile east of Tugaske. The bird had pinkish underparts and a divided, ridiculously long tail about 12 inches long.

Fran came to see me that weekend and described the bird to me. I opened my field guide at the Scissor-tailed Flycatcher, and he said that was exactly the bird he saw. Dr. C. S. Houston tells me that this is the third sight record for Saskatchewan, with previous reports from Milestone in 1970 and Lumsden in 1975.[1] [2] — *Hugh Hedger,* Box 41, Tugaske, Saskatchewan, S0N 4B0.

[1] BRADLEY, J. E. 1971. A sight record of the Scissor-tailed Flycatcher fo Southern Saskatchewan. Blue Jay 29:34.

[2] MACAULAY, A. J. 1976. Sight record o the Scissor-tailed Flycatcher fo Saskatchewan. Blue Jay 34:95.

Shaggy Mane mushrooms *J. B. Gollo*

MUSHROOM CORRESPONDENCE REQUESTED

I would be interested in correspon ding with anyone who collect studies or photographs mushroom and related fungi in the Prairi Provinces and British Columbia. have been studying and eating wil mushrooms, mostly in Saska chewan, for three or four years.

I would like to hear from peopl with similar interests to compile ir formation on distribution of variou species, and also to make contact for field investigations in variou parts of the province. If intere seems to warrant, I would be ir terested in starting an occasion newsletter to be distributed amon amateur mycologists. — *Robe Kreba*, Saskatchewan Museum Natural History, Wascana Parl Regina, Saskatchewan, S4P 3V7.

SASKATCHEWAN NATURAL
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